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NATIONAL STRUCTURE VED

PROGUNEIMENT SECTION CURRENT SERIAL RECORDS

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SYMBOLS

d_1	Actual small end diameter inside bark - inches
d_2	Actual large end diameter outside bark - inches
d_1^*	Small end scaling diameter inside bark - inches
DI	Density index - pounds per cubic foot
L	Actual length - feet
$L^{^{\dagger}}$	Scaling length - feet $(L = L' + trim allowance)$
n'	Number of truckloads in the sample for the density index
V_B	Scribner log volume - board feet
v_{c}	Cubic log volume inside bark - cubic feet
\hat{v}_{c}	Estimated cubic volume outside bark - cubic feet
W	Actual log weight - pounds
\hat{W}	Estimated log weight - pounds

ABSTRACT

This paper presents a practical method of estimating the weights of logs before they are yarded. Knowledge of log weights is required to achieve optimum loading of modern yarding equipment. Truckloads of logs are weighed and measured to obtain a local density index (pounds per cubic foot) for a species of logs. The density index is then used to estimate the weights of remaining logs before they are yarded. Estimates are made directly from graphs, tables, or a slide rule.

KEYWORDS: Logs, weights, logging.

1.0 INTRODUCTION

The forest industry has long recognized the need for a practical method of estimating the weight of logs before they are yarded. This need has accelerated as aerial logging systems having critical weight limitations find wider application. Analytical techniques which provide payload capabilities for these yarding systems are now available. Log weight estimates are needed for optimum utilization without overloads.

This paper presents a method of estimating log weights by use of a factor called a density index. Before log weights are estimated, the local density index for a species of logs is found by measuring and weighing truckloads of these logs. The density index, found in this manner, is used to estimate the remaining logs of the same species before they are yarded. Graphs and tables for estimating log weights are given as well as the mathematics for a slide rule.

This practical method of estimating log weights should be of interest to all concerned with the operation of weight-sensitive timber harvesting equipment.

2.0 BACKGROUND

A cooperative study / with the University of Washington's College of Forestry was performed to obtain some insight into the variations in log density. This study analyzed logs of several species from locations in Alaska and Washington. Analysis showed that the ratio of weight to cubic log volume has a much smaller variation than the ratio of weight to board-foot volume, and the study recommended that further efforts be directed toward a method of weight estimation based on cubic volume. Appendix I discusses the board-foot to cubic-foot ratio as a function of log size.

3.0 ANALYTICAL APPROACH

In order to devise a practical method of estimating log weights, several assumptions were made. These are listed below:

- 1. Reasonably accurate cubic volumes of logs can be obtained from the scaling length, the large end diameter outside bark, and an assumed taper.
- 2. A sample of log cubic volumes and weights can provide a measure of the green density (density index) which can then be used to estimate log weights.
- 3. The green density of logs is reasonably constant for a given species and location.
- 4. Gradual changes in the green density due to location and seasonal variations can be determined by a moving average of the density index.

^{1/} K. J. Turnbull, L. V. Pienaar, and I. E. Bella. Report on a study of log weight estimation. (Unpublished paper on file at Pac. Northwest Forest & Range Exp. Stn., Seattle, Wash.)

5. Volumetric errors, due to differences between actual scaling lengths and between actual and assumed taper, can be considered compensating in that the error is contained in both the sample of logs used to determine the average density value and in logs for which an estimate of weight is desired.

These assumptions ignore minor variations which are known to occur so as to allow formulation of a practical method of estimating log weights. Diameters are measured outside the bark to account for volume of the bark and to include variations in bark thickness.

There are variations in taper from tree to tree and from log to log in the same tree which can cause errors in cubic volume estimates. A method of estimating cubic volumes from the length and the sum of the end diameters has been suggested. While this method may yield more accurate cubic volume estimates, it cannot be directly applied to the critical problem of determining the length to buck a log for a given weight. The bucker generally knows the large end diameter since logs are cut from the butt end to maximize value. With a system based on the sum of the diameters, the bucker is left with two unknowns at this point: the length and the small end diameter. This method, based on large end diameter with an assumed taper, provides the bucker with a direct means of determining the length to be cut for a given log weight.

Cubic volume approximations and variations inherent in green density cause differences between actual and estimated log weights. For a yarding system that has little or no tolerance for overloads, estimates of log weights must be below specified capacity to reduce the probability of overloads. For example, assume the difference between estimated and actual weights for individual logs has a standard deviation of 12 percent of the actual weight. A reduction in capacity of 10 percent for estimating the weight of single log loads would result in the probability that about one load in five is over capacity. A reduction of 20 percent would result in less than one load in 20 being over capacity.

The mathematics of this method follow from the assumptions listed. From a sample of logs, a density index is found by taking the ratio of log weight to cubic volume. If truckloads of logs are used, the procedure given in Section 4.1 consists of finding a density index for each load,

$$DI = \frac{\Sigma W}{\Sigma \hat{V}_C},$$

(see the list of symbols, inside front cover, for the meaning of these and other symbols) in the sample and then obtaining an average of the density indexes,

$$DI = \frac{DI_1 + DI_2 + DI_3 + \dots + DI_n}{n}.$$

The cubic volumes for the sampled logs can be obtained from tables 1 and 2 (Appendix II). These cubic volumes are based on the formula,

$$V_C = \frac{\pi}{576} \left(d_2 - \frac{L}{16} \right)^2 L$$

which assumes a taper of l inch per 8 feet of length. In the calculation of the values listed in the table, a trim allowance of l inch per 4 feet of length was added to the scaling lengths.

Applying the density index in order to estimate log weights can be considered the reverse of obtaining the density index. Namely, log measurements are used to obtain the cubic volume which is then multiplied by the density index to estimate the log weight. That is,

$$\hat{W} = (DI) \hat{V}_{C}$$
.

In practice, the user need not be concerned with cubic volumes. Tables, graphs, and the mathematics of a slide rule have been provided so that a weight estimate can be obtained directly from the density index, the large end diameter, and the scaling length. Both the curves and the tables for log weights in Appendix II are based on the same equation as used previously for the cubic volumes.

An alternate method of estimating log weights can be provided by a slide rule. This requires that the previous expression be transformed into a form similar to

$$\log \left(\frac{\hat{W} \cdot 576}{\pi}\right) = \log (DI) + \log (d_2 - \frac{L}{16})^2 + \log (L).$$

However, the above equation is not satisfactory for a slide rule because the variable (L) appears in the logarithm of two terms. The (d_2 - L/16) term can be approximated by (d_2 - 2) for lengths up to 40 feet. This corresponds to a length of 32 feet. If logs weighing 10,000 pounds with a density index of 50 are considered, this approximation results in estimates that are about 4 percent low for a length of 10 feet and about 4 percent high for a length of 40 feet. These percentages will be larger for lighter logs and smaller for heavier logs. For lengths beyond 40 feet, the error introduced by the approximation becomes large. To avoid excessive errors, lengths for the slide rule beyond 40 feet can be obtained from the graph for a density index of 50 and a log weight of 10,000 pounds. Figure 1 shows a slide rule for estimating log weights.

4.0 SUGGESTED PROCEDURE

The following is a suggested procedure to obtain log weight estimates. The procedure consists of determining a density index for each species and location by sampling logs. Once the density index has been determined, the weight of logs can be estimated.

4.1 Sampling for the Density Index

The density index is found from an initial sample of log weights and dimensions. Truckloads of logs are convenient units to obtain these data. The

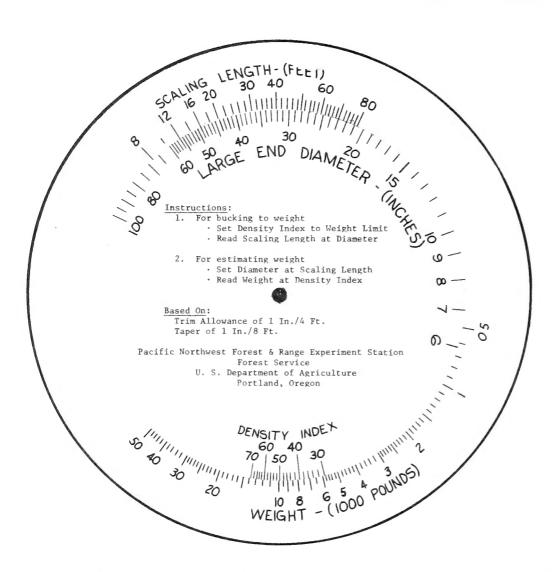


Figure 1.—Slide rule for estimating log weights.

density index can be obtained from other sources such as individual log weights and measurements or knowledge from previous nearby logging operations. Four or five truckloads or their equivalent in individual logs should generally be sufficient for a reasonably accurate density index.

To compute a density index for a truckload of logs, the net log weight and cubic volumes must be determined. Scaled cubic volumes are obtained from the large end diameter outside bark and the scaling length by referring to tables 1 and 2 of Appendix II. A worksheet is given in figure 26 of appendix II to facilitate the determination of density index of a truckload of logs. An average of the density indexes of several truckloads provides the density index for estimating log weights.

A moving average can incorporate density changes due to time, dependent influences such as seasonal variations, and gradual changes in location. A moving average is constructed by periodically obtaining a new sample for incorporation in the average density index and eliminating the oldest sample. An example of a four-load moving average of density index is shown in figure 2. A worksheet (fig. 27) is provided in Appendix II.

4.2 Estimating Log Weights

Once a density index has been established for a particular location and species, the weights of logs can be estimated from the graphs or tables in

Figure 2.—Example of moving average of density index.

Four-load moving average

Logging site: Paddle Creek Species: Douglas-fir

Sample number	Date of sample	Sample density index	Moving total of density index <u>l</u> /	Current moving average <u>2</u> /
1 2 3 4 5 6 7 8	Jan. 2 Jan. 2 Jan. 3 Mar. 2 May 3 July 1 Sept. 2 Nov. 2	45.2 51.2 40.1 49.7 42.0 43.5 41.7 52.8 44.5	186.2 183.0 175.3 176.9 180.0 182.5	46.6 45.8 43.8 44.2 45.0 45.6

 $[\]frac{1}{2}$ Add newest sample and delete oldest sample which was included in previous total.

Appendix II, or from a slide rule. Each of the graphs and tables in Appendix II is for a specific density index. A range of density indexes from 30 to 70 pounds per cubic foot is included. The nearest density index established by sampling is used for estimating log weights.

Two different problems are encountered when attempting to determine capacity loads for yarding equipment. In large diameter timber, single logs may make up the majority of loads and each log must be sized to approach the weight limit of the equipment. In smaller diameter timber, an estimate of the weight of each log is necessary to combine a number of logs into a capacity load. The graphs are arranged for the solution of either problem. When the size of a single log must be found to approach a capacity limit, the graph nearest the required density index is entered along the bottom with the large end diameter. A line is followed up to the appropriate log weight and then over to the log scaling length. When estimates of log weights are required, the graph is entered along the bottom with the large end diameter, and the line is followed upward until the proper length is reached, and the weight is read. Large end diameters should be measured outside the bark and lengths should be those defined by local custom or contract. The tables are used in a similar manner. For a single log load, the large end diameter is located in the table. The indicated

^{2/} Divide moving total by number of samples in moving average.

row is followed until the weight at or just below the limit is found. Bucking length is then obtained from the top of the table. For a multilog load, the weight estimate of each log is found directly from the large end diameter and scaling length.

Butt logs must be treated somewhat differently from other logs because of the concave exterior surface due to the root swell. Probably the best way to handle these logs is to make an estimate of the large end diameter outside the bark as though the taper of the log continued through to the end, disregarding the swell, as shown in figure 3.

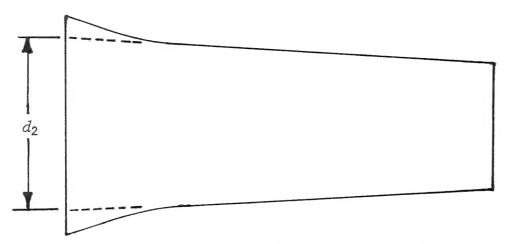
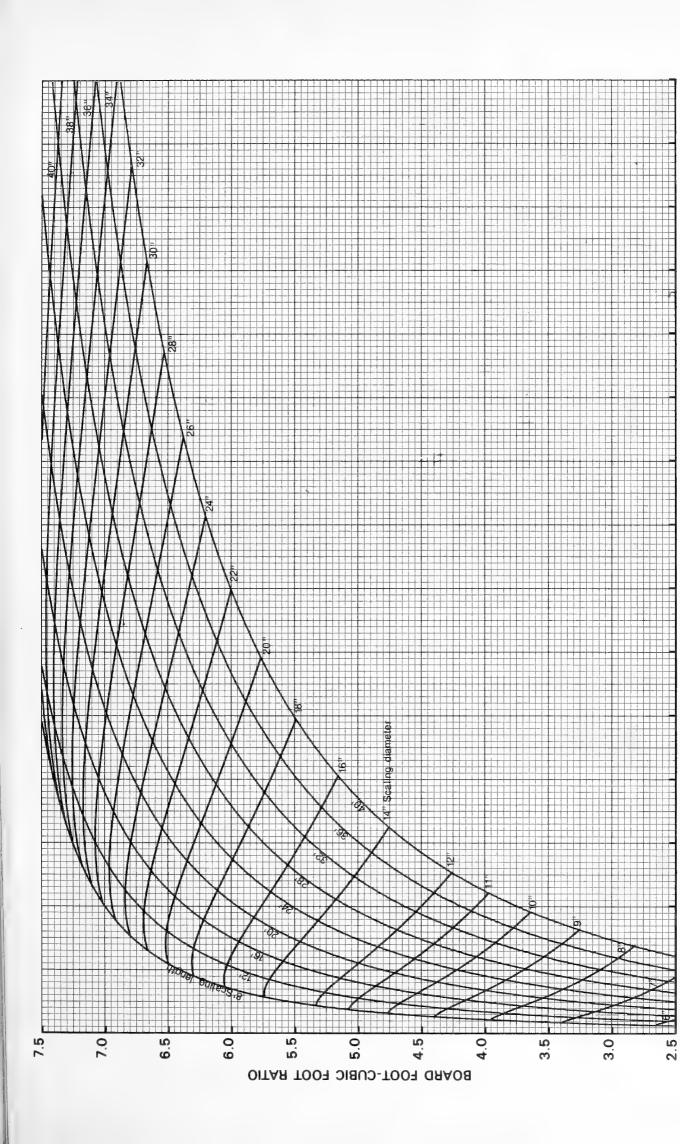


Figure 3.—Estimating large end diameter (d_2) on butt log.

APPENDIX I THE BOARD-FOOT TO CUBIC-FOOT RATIO

Log weight estimates are commonly obtained by multiplying the board-foot scale of a log by a constant. The particular constant usually depends on the species of the log and the experience of the estimator. Use of the board-foot scale as a basis for weight estimates is due primarily to the logger's familiarity with that system of measurement. Unfortunately, the board-foot scale is only an estimate of the lumber yield of a log rather than a measure of its wood content.

Figure 4 shows the relationships between the board-foot to cubic-foot ratio and the cubic volume of logs for various diameters and lengths. The ratio can be considered a measure of the amount of total wood content which is included in the board-foot scale (if all the wood was included, the ratio would be a constant 12). The plot is of interest to the problem of log weight estimation because it clearly shows the wide variation of the board-foot to cubic-foot ratio with log size.



The plot is based on the scribner formula rule, $\frac{2}{}$

$$V_B = (0.79 \ d_1^{'2} - 2d_1^{'} - 4) \ \frac{L}{16},$$

which approximates the Scribner log rule to provide a continuous curve. Similar relationships can be obtained for other log rules and scaling practices. Cubic volumes were calculated by the Rapraeger rule, $\frac{3}{}$

$$V_C = \frac{\pi}{576} (d_1 + \frac{L}{16})^2 L$$

which assumes a taper of 1 inch in 8 feet. In calculating these cubic volumes, a trim allowance of 8 inches has been added to the scaling lengths,

$$L = L' + 8/12,$$

and one-half inch has been added to the scaling diameters,

$$d_1 = d_1' + 1/2.$$

This is to correspond with the west-side scaling practice of dropping all fractions of an inch from the scaling diameters and adding a trim allowance to the scaling lengths.

APPENDIX II

TABLES, GRAPHS, AND WORKSHEETS

The following tables, graphs, and worksheets are provided for determining the density index and for estimating log weights. Tables 1 and 2 are cubic volume tables for determining the density index. For convenience, a worksheet (fig. 26) is provided for computing a density index from a truckload of logs. Figure 27 is a worksheet for a moving average of the density index. Log weight estimates can be made from the graphs (figs. 5-25) or tables (tables 3-44) after the density index has been determined.

^{2/} Donald Bruce and Francis Schumacher. Forest mensuration. New York, McGraw-Hill Book Co., Inc., 483 p., 1960.

 $[\]frac{3}{J}$ J. R. Dilworth. Log scaling and timber cruising. Corvallis, Oregon State University Book Stores, Inc., 448 p., 1965.

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Table 2.--Cubic log volumes for scaling lengths of 34 to 60 feet

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Table 3.--Log weights for scaling lengths of 4 to 32 feet: density index = 30 pounds per cubic foot

[Assumed taper of 1 inch per 8 feet, trim allowance of 1 inch per 4 feet]

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Table 4.--Log weights for scaling lengths of 34 to 60 feet: density index = 30 pounds per cubic foot

[Assumed taper of 1 inch per 8 feet, trim allowance of 1 inch per 4 feet]

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Table 5.--Log weights for scaling lengths of 4 to 32 feet: density index = 32 pounds per cubic foot

[Assumed taper of 1 inch per 8 feet, trim allowance of 1 inch per 4 feet]

LOG WEIGHT (KIFS*) FOR DENSITY INDEX=32

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Table 6.--Log weights for scaling lengths of 34 to 60 feet: density index = 32 pounds per cubic foot

[Assumed taper of 1 inch per 8 feet, trim allowance of 1 inch per 4 feet]

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Table 7.--Log weights for scaling lengths of 4 to 32 feet: density index = 34 pounds per cubic foot

[Assumed taper of 1 inch per 8 feet, trim allowance of 1 inch per 4 feet]

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1.32 1.32 1.32 2.43 3.74 3.76 4.84 5.13 5.41 5.07 6.57 7.68 7.66 8.15 8.68 7.44 8.01 8.57 9.13 9.68 1.3 1.32 1.32 1.32 1.32 1.32 1.32 1.32	0.4		1.73	2.36	C	30.00	73	4	ω.	- 4		~	-	0	~	S	6.7
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3 1.5. 1.5. 1.5. 1.5. 1.5. 1.5. 1.5. 1.5	200	177	1.97	(7) (5) (5)	(V)	CE.	47 0	٢				α:	-3	0	LO.	- 44	0.0
1.52 2.26 3.44 3.72 4.45 5.46 6.54 6.55 7.24 7.87 8.58 9.54 10.66 10.66 10.54 11.65 10.66 10.54 11.65 10.66 10.54 10.66 10.54 10.66 10.54 10.66 10.54 10.66 10.54	t t			100	1 -9	د ا	10	P.				2	α.	-3	0	n)	
1.52 2.26 5.00 3.02 4.044 5.16 5.86 6.21 6.85 7.24 7.97 8.58 9.58 10.35 11.14 11 11 11.15	1 1	J	, eng	0 2 0	L	r	(LEV				u	4-1	8	3	0.0)
	45	5	2.26	3.64	1	7707	7.	0				0	w	2	0	0	44
10.15	46			71 0 71	(1	- 6	(√) •	77				C	9	4	6.3	1.0	4
1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1	1.2						V.	1				0	(4.)	ゼ	, s	14 t 00 q=1	C
1.8	-1°	ſ ø		, ,	()		ď	153			8 • 27	4.	٠	r	5 0 F	200	W
1 [] [.	57	T.) ° C		7		- 4	0		9	8.62	.t	0.2	1.0	φ (m)	2.5	547
1	ن5	-	3°	4 4 E a	44		~ .	W		7.	3.95	α	9.6	۲. ۳	2,3	3.1	4433
2	51	0	1000	*	G * †		٤	ш	-	4	G . 7F	2 . 2	1.01	. O	Z . Z	305	-3
2.12 7.31 7.51 7.51 7.52 8.18 8.67 9.16 10.13 11.09 12.04 12.97 13.90 14.82 15.4 13.4 13.4 12.97 13.90 14.82 15.4 13.4 13.4 13.4 13.4 13.4 13.4 13.4 13	55	- 2	~ , ,	,	1		2	a,	N/ *	8	47.6	5 .5	1.5	702	(A)	707	MAN I
0.13 0.67 0.04 7.047 8.65 0.64 0.65 11.65 12.64 14.045	2,4	- 1	5 M		Η.		2	4-4	4	1	0.1) 0 T	2 . L	6.3	6.0	α • 1	LE V
5	7 1	T-1 0	((*)	{ }. *	(4.7		3	L.	٤.	5	ر د د	1.5	2.4	47 0 7	4 · t	50 4	W
7 2 7. 7. 1 3. 4 4. 5. 7 4. 4 4. 5. 7 4. 4 4. 4 4. 5. 4 4. 5. 4 4. 5. 7 4. 5. 5. 4 5. 5. 4 5. 5. 4 5. 5. 4 5. 5. 4 5. 5. 4 5. 5 4 5. 5. 5 4 5. 5. 5 4 5. 5 5 4 5. 5 5 4 5. 5 5 4 5. 5 5 4 5. 5 5 5 5	5.5	0	, ,		_ ^			30		φ. φ.	0.3	7.0	2.0	7.	5	9	C)
7 24 3.54 1 7.18 A.34 9.40 10.66 11.76 12.87 13.0A 15.07 16.16 17.23 19 8 27 7.77 8.95 10.42 11.70 11.91 12.18 13.24 14.40 15.62 16.75 17.86 18 9 7.0 1 3.0 3.4 3.4 3.8 10.18 17.70 11.47 12.62 13.82 13.82 14.40 15.62 14.35 14.35 14.35 14.51 15.6	56) v	yd 9 0	, , * *			C .	44		3.5	1.0	7° 2	3.4	405	5.5	9 8	~1
8 2.27 3.27 3.27 7.24 7.84 7.82 11.91 12.18 13.24 14.44 15.65 16.75 16.75 17.85 18.85 18.85 1.85 1.85 1.85 1.85 1.85	25		4000	7		10		5	ے د	LC I	407	€ (1.10 (α. 1	O .	er l	£ .	7.5	T) (
THE MANUAL COUNTRY CONTRACT CONTRACT CONTRACT TO A CONTRACT CONTRA	33	,	1 1 4	4	- 1		ر ا	a	7 0 7	· +	2.7	3 0 2	1 0	5	6.7	0.0	30 K
	υ. σ		~ ,	1 * 1 *	T		JT (H .		10.6	ů.	x' • ∀,	9	- L	100	11 0	٠,

Table 8.--Log weights for scaling lengths of 34 to 60 feet: density index = 34 pounds per cubic foot

[Assumed taper of 1 inch per 8 feet, trim allowance of 1 inch per 4 feet]

LCC WITCHT (KIFS*) FOR PENSITY INDEX=34

INCHES)	9	5.	90	2 7.	1,1	25	43	44	44	4.17	5 5	55	52	55	58	Œ
ď		75	0.0	G	0,7	0	0	10	α, (:	O.	4	2 5 2	- 0	0	٠	4
7	. !	13.	1	-	, ,	100	1 2	+	77 -	77 -	. +	4 -	3 4-	× +	212	3 4
. 90	10	* 22	000	200	4 (7)	1 (V)	. 2.2 •	. 22	. 22	* *	- 22		.21	. 23		
6		200	• 31	1	47 (Y)	. 32	.32	(4)	100	(1/1)	10	187)	(0)	PO.	Pu	(4)
37	43	4,0	1 40, 0	7	7	0.43	-3	. 43	27.	1	3	Jil	3	-21	17.73.0	17 10
구 구 구	57	+	6 .	1	750	li (Li i	UN 1	اعكا	13 - 13	us I	LC :	I OL	ro i	lμ3 1	انكيا
12	J .	67	400	-1	J. J.	0	37.0	r- 1	r	N-1	N .	Pm 1	~	r~	r~' 1	~
N .	N- 1		e 7 e	,C 1	0° 0°		w .	œ.	α.	an -	σ.	m.	6.0	er i	6.0	σ.
14		.35	6.93		0	1.2		2			刏	941	T		0	7
100	- 0	, e t	1.10	π^{+}		1.21	2	W	C/a	CVI	10	841	(Y) :	IV.	3 .	J.
16	0	3 % 7	100		-	1.41	7	7	3 1	201	ur	n to	4.1	46111	اي	ا ۾
17	- 6	1 . 4 4	1 . 47	137		1.63	9 6	9	1.72	P~	90	00	0C-	m	Q.	ഗ
ص ا	40.	1.62	1.50		0	1.87	اله	0	o i	2	-2	quos .	-1	C. II 1	0	£7
1 C		€ 1 0. € 1	0 • H	0 (2.12	T .	٠.	OU I	PD (M) I	-3 1	4	10. 1	، دما پ	9
20	-0.1	0.70	2.14	N .	0	0 2 0	7	7	ın l	الت	اک	1-1	٣.	മാല	2	0
2.1	-	90 C	Z + S H	0 6		76.5			2 0 ° 0 ° 1	0 (27	с	# 1	N 1	Ν,	M) I
22	0					1 0	-1	2	⊣h.	11	21	ric	2	8,11,		
0 0	-	2 . 10 T	75.0			X 1	0.	† t	0.0	5 (٠.	x. (٦	э.	i	ri (
42	a :	5 7 6			9		-		z	5 1	٦)'	No. 1	-	T 1	2	일
22		*) . 3 1 •	2. 1 2. 1 4. 1	0	-0	M (M	. ن	d .	N I	M 1	5	(C) (/ 0	20 1	m .	انت د
97		40 . 50	5083			4.82	7	3 1	اع	N-	T	ا ات	7	A) (20	el.
72		ر ا ا ا	34.4	11 C.		4 - 7	~ 1	U (. د	α,	M (7.77	9 1	XU F	5.	
200	B	L 0 4 .	4.00	0	0	1. S	7	V F	# 0	۽ ايد	100	- IC	7	431 6	-	6
n 0	0.0	0 .	000			9 0	Li e	٠.	5 1	н.	2 .	2	٥ •	XC .	٦.	e
34		4 4		3 (000	2	7	ml c	77/0	7 1	73 L	1	_E : C	1	
- C	10	0 6	T = 1		£ 4	C 0 0 U	. 0	٦٠	D N	ي ن	<u>_</u> a	0.9	- r	T - 11	4 1	() C
32	0 1	1000	T : 0 C	٠ ١ ٠	0	7 24	2	-14	ola	> €	0 -	નાં! પ	20	01-		u o
3 (2)	0 4	0 U	1 (2) (3) (4) (4) (4) (4) (4) (4) (4) (4) (4) (4			0 0	0	•	5 3	4 1	C	. 6			1 - • :	
1 th		7 0 1 1	7.29	P 9	1	2000	7	19	15	. 0	R	- LOT	0.1	7	7 . 6	1.0
₩ 1					U	2 .		1	4.6	12	9	(e)		1.1	-1	1.7
27		• 1			c	0 7	4	7	1.01	J. 6	G.	10.1		10 O	44	
7		5- 4 B -4	1 4 1 3	1. 1	75	0000	Ψ.	L.	1 0 0	7	1.04	1.9	63	2 . 2	0.0	3 . 2
39		31 0	1	C	-	C 7 L	1-	-	10	100	2.1		2.0	2	3 € €	7
) †	-0	3.0	4			110 17		F .	1.0	7 . 7	C	3.2	0,	0.17	7 . 7	. 7
41	-	12 "			4-4	11.56	C	1,01	ς • Σ	E. P.	(M)	0 0	17 .	4. 3	5 . 5	e UI
45	5	7 ° C B	- ·	11.27	11.	12,29	E ·	-	7 . 2	307	1 a 2	7 9 7	CUIT	LC:	6.1	() ()
5 .	, ,		- 4	- 1	! !	- U	44 (9	C (7 0 7 1	- 1 - 1	10 t	0 0	T	ن د ا ك	200
**	0	11.00	had I.	Ç .	1.50	1305/	20 L	5	40.5		500	9 6	T P	0 0	o r	
n	-	1001		7 0 1		14.00	1. 0 2.		3 .	7. I	() ()	1 0	0 0			יינ
0 10	° .	17.04			9 7	000	700		1 0	7 ° 7	- a	. 1	1 N 0))))	L 14	• -
. «			7	7 - (1 1 - 1		- 6 6 6 7 8			7 . 6	- a		0 0) () (, 0	, 4-	4 ()
543		3		1 2 4 4	7	1 / 1	, ,	7 . 7	1		, x	177	100	1	14 6 (4)	6 (*)
		10 17		17,07	17.	17. A.	30.	. W		- L	0	101		4 C1 4 C1	7 6	ە تىر
51	1.7	1. 0 1	2 .	1.5	17.	1 12 4 57 6	A C	0	. 0 1	0	1.6	200	*** ****	. 8	4.5	5
55	~	1.001		P-	10	15024	r . C	10 1	J . C	1 + 7	C .	6	4. 2	4.5	9 6	·
55		17		T	C.	0.13	*1	°.	10.	400	204	1 0 E	9	0	9 . 9	7
24	r	1701			5	7000	107	a.	5	0.0	7.	2 .	6.1	6 ° J	7.07	e W
55	P.	10.44		C	cu.	21076	500	403	3.0	دا ه را	3	() ()	-1 e 1	ر ع	8°8	0.
56	0	19,15		0	21.	22.60	ے ، ریم	(A	50	500	9 6	7 .3	00	6	7 .	0.0
٦ / ۵	7.000	1.10, 7		23.67	C 6	7 2 4 4 (2 4 C F	24.45	75.4°	200000	27 = 4.1	Per	7 + 3 J	31.2K	31,10	56.01
. 50		25.35		G P	0.00	2 2 0	0 P	0 1	0 7	0 0	9 .	0 1	3 2	7 0	9 1	9 4
2	2				7 77 /	1 1 1 1 1					7	4	13	0	4	

Table 9.--Log weights for scaling lengths of 4 to 32 feet: density index = 36 pounds per cubic foot

[Assumed taper of 1 inch per 8 feet, trim allowance of 1 inch per 4 feet]

LOG WEIGHT (KIPS*) FOR DENSITY INDEX=36

A 205 F						de la company de		JONE ING	HISNSTH	H (Frit		***	ŧ			
LJ w l	3	ч	c	16	(0	16	46	17	4	.3	,,,	77	36	c. a.	*,1	22
9	*;	4 7	, , , , , , , , , , , , , , , , , , ,				. C A	α. 	. >		05.	4-1	₩.	. 11	• 1.	e det is
~ :	3 .	* J.	2	* . B	U .		.11	•	• 12	e 1 3	.14	. 14	-	a 1.5	• 16	. 16
E 0		, 7 0	- 10		4.6		~ 4 °C	410	4:6	me C	5-1 -1 -1 -1	V 0	N 6	32.	7.10	. 23
40	00 e	0 1	144		. 24		13 0	10	00	u r	. M	(Jac	u 14	4 B	3 0	40.
11	000	. 14	00		. 2r		2 100	رجارا	3 M	/1PO	0,41), ~ 3	3	; 00.47°	100	. 51
17	+ + 0	• 16	•21		L (Y)		173	- 3	3	-3	- L	140	- 40	. e.	. 6.1	4 42
P)	0 77	010	.25	0 51	. 3F		-3	0 17 0	140	127	530	(Q)	140	.71	47.	.77
14	• 15	•25	• 24		046		45)	LC.	451	4	.70	N-1	P-1	*84	9 8 B	ο,
15	.17	• 26	0.34	• 41	0 ts C		w	CD.	2	\sim	. A 2	0	6			4.0
16	.23	• 29	e 3.A		• 56		~	1	or:	Œ.	40.	3	0	- 40	44	2
17	270	a \$ 5	71.0	0 1 %	61.7		-	Œ,	C .	۷.	100		۳.	- 9	1	J
1.8	1, 2 .	1 5 0	1, 20 0	ه ادران	. / 1		<u> </u>	C	٠٠٠	. 1	1.5	L.	M.	1.40	4	ψ.
19	, > .	2 1/2 0	9 9	a	2			١	- 1		100	47 0	· /~		·-	Œ,
26		177	0 1.4	• 75	300		-	0	0	3	1052	8	-		5	2
21	0 345	. 51	-67	9 X W	5		C)	P)	3 1	5	1.69	α.	0		4	PO :
22	E 773	.56	0.74		ارت او		3	4	الأدا	~	1 . A	ا ر	1.	Φ,	3	LL'S.
23	0.43	- 62		1	7		41	w)	۲.	α,	2.06	5	~		ď.	QU:
24	645	.67	.68	0	m).		ا یک		Œ.	1	2 + 25	7 6	9	691	O.S.	9
25	0.00	0 1 10	0 ·	1019	3:		au -	C .	-	€.	2010	0	CC .			20.1
200		5	1007	-	υl ι		ارد اه		٠.	:	7902	2 .	ا ر ہ		7 0	١
27	25.0	. 8.5	1013	5° ° 7°	w 1		T 1	N.	7 .	9 1	00000	* 1	N) 1			(3)
200	0.5.6	5.0	1.021	1.50	10			3,	ه ک	X 0	N P	0.	90		. i.	Y.) \
) · · · ·	٠ د ت		1000	H C - C	5		1	٥		- 1	£ 7	ا ي	<u>ت</u> .		1,1	<u>.</u> د
36	0 / 1	200	F 0 2 7	10 63	-10		4	X L	310	() •	5 6 5 2	217	el . B		` .	9 7
-	. H .	4 + 2	. u	1 0 1				. 0		. [-	0 17		, 9			•
75	700	1 23	4 60	2 4 (1	U		0 0	ت ا	2 3	- 5	9	-	L		3 0	9 4
36.5	2 -	1 9 7	D	7 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	ی د		0 7	3 4	9 7	٠.			4 4	9 -		4 G
M . W	~ C °	1014	, , , , , , , , , , , , , , , , , , ,		- 27			. (16.01	JP o o			٠	. 0
36	1.02	₩ 6 H	2.02		0		0	4	70	00	5.28	-	471		Ci.	4
37	1.00	1.61	2014	2.65			-	2	9	77	5000	\supset	20		ή, e	00
er *5	1 . 14	1.7.	1 1 W 14	2000			7	4	0.	3	1,001	77	~		5	
δ£.	1.624	1.79	S . S	N . 2	<u>ا</u> را		9	Ω.	₩.	-	5000		0 1		011	4
0.5	100	1.00	6.5	50 1 L	- 0		K 4	М.	3 1		را ماه ماه	e (6.	0.1		0,0
- (\ 1 -3	1.6	7	3 - 2	7 . 12 . 2			- P	1 P		9 4	7.27	a d	. 4	0 (<u>ت</u> و ا ه	. 0
E 4	1.45	2.18	2 . A .	3.62	10		1 6	0	100	0	7.53	, [/	7	9 9		1 0 1 2 1 2 1 2 1 2 1 2 1 2 1 2 1 2 1 2
22	1.553	2.29	13	3077	177		0	03	9	-	3 · C	1 6		-5	0	102
45	101		1010		4.71			L-	J		19 2 ° 19	٥	1	-	1.1	الك •
46		7.6	7 0 7 3	401.	J.		7 .	0	0 0	: ب	4.77	٠,	•		0 0	45) (0)
24	1.075	2.61	3047		911		٠.	4	ا دا	20.1	9.17	0 0	7.0	÷.	2 • 2	ชา: เบา
10 C	· · ·			7 * **			ا پ	<i>i</i> :	J () d o c	· .				, . 2) 4
7 3				1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	_ @		. 4	C =	. 4	√ L			*		a ,	•
6.4		,	• [01			داد • ا	- :	. ' 0		31	1.0	1	م ا ر		-1 r =1 : F: 3
55							. P	I.	· /*:				1 P	٠.,		·
53	1	~	7 0, 4 4		J.		-	4	1	7			7 . 7	-5		- G
54	0 7 7	* * * * * * * * * * * * * * * * * * * *	t . 1 a +	-1			L.,	-	e (2)	1.1	~ ~	- 0 - 0r 1	4.2		5.0 7	707
55		1 0 0 7	107.	0 0	-		P ¹	0 0	100	101	C ~	1 . 7	4 . 7	ia Li	0 0	7 ° C
5F	P 4 4 7	6 4 3	4 14 9	-	~		0 ° F	1.				40.7	P .	4	7 . 7	4 0 1
in li	2 6 6 6	1 0 0 P	FC 15	5. 47	7.51	20 0 0 4 6 4	10.00	10 m	11.25	12.45	17.653	14.80	1 F 9 G F	17.11	1 0 0 0 0 0	19.37
200	2.77	1 2 4 3	211	0 1				0 4	0.0	4 : 1 2 U	7 - 3	• . u	7:1	. 0.		2 K 4 E 2 E
96	2.86	1001	2 0 2	0 0	4 3		9 (• 0	10) (II) (I) [*	ru	- 4	7 . 7			. U
>) 		P	b			r m -t	-). = J	1				•	3 -	9

* 1KIP=11)(FCUIPS

Table 10.--Log weights for scaling lengths of 34 to 60 feet: density index = 36 pounds per cubic foot

[Assumed taper of 1 inch per 8 feet, trim allowance of 1 inch per 4 feet]

33	and the second s			And the state of t				SCALING	G LENGT	H (FEET)						
AMETS .	7	200	eg to	60	77	45	5.7	77	46	46	J.	55	7.	56	5 8	
9		# 1 S	.1.	.10	+16	0	.3	60.		ව ම	e (.8	6.07	.07	-0	. (E	•
7	-	• 15	.15	• 16	44	→ 1	• 16	9 15	4	Lis I	+1	T	₩.	च्चे ।	T	•
00	N) I	• 23	\$ 2 S	0.24	NI	NI	NI	42.	• 24	• 23	N .	20 1	N 2	N) r	N 1	•
J. 1	v) :	2 * 6	2.0	ه ۱ د د	9 4	Y) ;	Y) =	975 0	40.0	400	300	りご	4	0 :	v) 4	•
1 1 1	3 1	127	។ ភេ	\$ U.	3 15	1 5	8 4	, n	: 4	. A. A.	t (r u	2 5	ri sc	2 5	•
2	(w)	190	000	2 Z C	~	1	.74	75	1	.77	-	· 1	· 1	00	100	•
1 100) C.	000		00.	. 30	0	. O.	0 0 0	0	, n,	σ.	- 0	- 0	10	٠	
14	C)	. 97	660	1.12	.5	0	3		T		Τ.	-	€	2	2	1.2
15		1.14	1.16	1.26	N	2	17		P/	- ac	3	77.	, t	-17	7 .	
16		1 . 7 .	1.65	1.0.1.	t	3	u)		P.		9.	9	~	7	~	
7	 	1.53	10° 10° 10° 10° 10° 10° 10° 10° 10° 10°	10 0	21	_	1.75	1.78	000		0. 0	5	0 0	ı د.	ر •	
10	97	1074	7 4 5	 	2 4	2, 0	، د			m! .	7 L	0 6	V V	2 4		•
20		2.21	2.26	. PV	1 3	. 15	د <u>ا</u> الله الله		9		000	0			. (i)	
21	2002	5047	2002	2.63	~	οr.	(K)		G.		4	10	M	7	77	
22	2.68	2.74	2.84	2 6 6 5	0		ι. V		۲O .		rU.	9	P=	20	8	
23	35.2	7.03	5 - 09	3.22	14	7	77		~		6	0	1	2	M)	
42	3.25	7.32	3.40	7.55	0	er:	0. 1		0	- a i	2	-310	rv c	9	-	
22	N = 2.5	7 ° C C	2015	5 • G	23	- U	0 4		\$ 0		٠, د	יויק	: u	٦,	2 ^	
27	0	2	0 3	7 7 1	212	0 0	<u>ا</u> ا	9 4	T 10		2	3 5			- 1	a (
200		4.66	77	95.4	400	- 3	L la) [~ • •		9 77	. 173	· ·	1	00	
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36	5.24	5041	5.54	Page 1	-1	6	-7				2	7	9	00	3	
Fi (2)	5.06	5.83	+5°C	5 - 5 5	-5 0	~ (au r	7.61	0.1		[- f	o, r	٠. ·	3 1	9 1	a c
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4.1	K	2 - 0	2 .	-	1		2 . 6	0	17 m	(P)	40 3	4.8	5.	F . 7	6.1	9
24	10001	11.69	11,37	1	-2	0	3.2	143	0 0 47	+	5 . 1	5.6		6.5	2 8	70
P 47	11,36	11.66	11.95	10 .	-1	0	6 ·	3.	4.8	L v	C .	4.00	6.9	7 . 4	7.9	00 (
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おり	100+5	1606 .	1		-	0	7.4	a :	3.7	6	U . 1	001	1 . 4	2.1	2. R	[43]
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1 2 1 2	10.5	10.	1 4.	000) o c		3 1	B [-	100	*	1 0	3	0 0
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5 5	17.61	. 3	14.00	3 . 14	2		1 . 7	, c	• • • • • •	• •		- 1	١٤	力。た	() ()	- 0
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Table 11.--Log weights for scaling lengths of 4 to 32 feet: density index = 38 pounds per cubic foot

[Assumed taper of 1 inch per 8 feet, trim allowance of 1 inch per 4 feet]

NDEXI 38	
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CENSITY	
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(KIES*)	
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33	

### ### ##############################	1 1 1 1 1																
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1	8			Cui	ᆔ	71		\neg	44		44	12.	.21	•22	N	N	. 2
	or ((Q) (C.3 -	4-1	4	4-1	ਹਾ। ਦੀ (N I	EV.1			N	α ()	3 M	• 31	143	•
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2.649 3.657 +.844 6.72 7.21 8.35 9.56 10.84 11.72 11.72 12.39 13.45 14.67 15.54 16.55 16.55 2.65 3.7 13.64 11.75 12.39 13.45 14.67 16.15 17.2 2.64 3.7 3.7 3.564 11.75 17.88 13.98 15.47 16.15 17.2 2.54 3.7 3.7 3.7 3.7 3.7 3.7 3.7 3.7 3.7 3.7	200	9 10	j M); 6 = 0	0	r (C	1 4	(C)	ን (ተ. ው - መ	Ø 40) (C	0	01	0 0	. d	1 G	ه ه ای ا
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2.55 3.79 5.47 5.47 8.67 9.86 11.46 11.04 12.21 13.37 14.52 11.65 16.78 17.85 17.85 2.7.85 2.7.85 2.7.85 2.7.85 2.7.85 2.7.85 2.7.85 2.7.85 2.7.85 2.7.85 2.7.85 2.7.85 2.7.85 2.7.85 2.7.85 2.8.85 2.7.85 2.8.85 2.7.85 2.8.85 2.	75	- 8	0	20	€ .			an •	40° 6.3°	6.3	1.7	υ α	٠. 9	E	6.1	7.2	G.
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Table 12.--Log weights for scaling lengths of 34 to 60 feet: density index = 38 pounds per cubic foot

[Assumed taper of 1 inch per 8 feet, trim allowance of 1 inch per 4 feet]

RGE F			Name of the Party	controler families misser miles emfantium		and the state of t		SCALING	G LENGTH	(FFE	T)	Action to the second se				
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7	44	4-4	27 10	• 17	.17	.17	•16	• 16	9	-1	हिं। स्पी	+	414	44.	(*) vrl *	•
20 00	11/11/2	NIN	6.7.5	6 6 5	37.0		625	62.0	• 25	Nin	, 24 26	V 10	N P	. 23	200	
10	3 3	* 'S	1 10	٠ ·	* * *	1 (0)	. 4) d)	0.4	2	0 0	• •	े जे • •	0 or		• •
11	WY	125	.50	. 00	39*	• 62	* E 2	. 62	*63	0	99.	(2)	1	• 65	.00	
12	0	1	.72	0.74	· 76	.77	.78	6.10	38.	n	88	ac.	(E)	98.		
4m4 4 600 -	ਹੀ ਜ ਹਾਂ ਅ	Á in			(Cr +	 	ф 0. 4 П	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	O 4	13 T	c c	(*) (2 (-) (7 (-) (7 (-) (7)	w P	ιΩ (C +	1 . 6	
+ 5	.14	m ;	10	1 07	1017	1.16	1 0 1 1	1.1	7	NI 3	1024	MIK	11/12	707	7.5	0
J 1	- ·	u *	4	4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4	4 //.	1 1 2 2 2 2	- C.	1 5 7 3	† (C	t N	7 * 7	(· 1 >	11 0		. U.	9 4
17	1, 1		- 1	107	1077	1.92	10.95	1.34	C	. 0	2012	-153	1911	2, 14	2.17	si as
18	80	CC*	T	1,95	2002	2.39	2.12	2,15	2	D/a	2.32	MOI	-31	2.47	2.51	- 8
2.0	3 - 7		2 + 1 2	0 2 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4	00 00	2.57	2.71	1 tc 00 00 00 00 00 00 00 00 00 00 00 00 00	2,57	7.50	30 ° C	N 20 7	7007	7.83	2.87	(1) IV.
21	2.55	2.61	0	2.77	2.8F	2.98	3.63	3.09	. 4	100	3.36	2	el io	3,66€	3,67	
22	2.63	2.89	0	80 E	3.26	7 . 37	3 = 37	3.43	E.	3.0	7.74	000	σ	50° m	4.11	
23	3.12	3.19	2	3045	3,56	2.67	7.73	3. 3a	0	C.	4.15	N	84.	2404	4.57	
7.70	F.,	4.5	. (3 1-1-	7	4000	11	a	E . [-1 0	0.7.0	P- 1	2 11	76 97	ا با ا ا ا ا	
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29	I ere	1 2 8		5 - · ·	r 0 + c	f . 1F	F . 27	F. 30	(O)	· CC	7.15	0	-31	7.66	7.80	8
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41		1 . 6 3 ,	11.6.6.1		12051	13005	17,72	7		9	15.12	5.	F . 1	٠,	7	7 0
いか	<u>.</u> .	11.71		Č :	1601	1.074	21.1	.e	B # +	7 (15.03	7 = 4	6	P. (0	a
4.5	11 0 1 0				2 · 3 ·	10 = 10 = 10 = 10 = 10 = 10 = 10 = 10 =	3 C 3 C 5 C T	÷ ;	U 6	7 0 0	15.67.7		20 N • z	ນ້ ດ	ည ၀ ၁၀	ي در د د
54	1	5/0	, ,	1,4	15001	14.02	16.25) L	7	0 0	500	9.1	0.7			
46	12,46	1 - 0 - 1	L # - 17		1 F . Q .	16.68	17.18	1.	() ()	a a	19.89		9	4-1	1. S	U)
24	+	11.0 P 4	2.5	2	16.72	1	17,82	Œ.	9.9	0 0	20.30	\$ ° 5	1.6	O.	0 e	B (Y)
Z .	14011	0	7	46	11041	a	10063	c"	0.	4 0	21.04	1,0	2 a F	P)		4
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Table 13.--Log weights for scaling lengths of 4 to 32 feet: density index = 40 pounds per cubic foot

[Assumed taper of 1 inch per 8 feet, trim allowance of 1 inch per 4 feet]

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Table 14.--Log weights for scaling lengths of 34 to 60 feet: density index = 40 pounds per cubic foot

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[Assumed taper of 1 inch per 8 feet, trim allowance of 1 inch per 4 feet]

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Table 15.--Log weights for scaling lengths of 4 to 32 feet: density index = 42 pounds per cubic foot

[Assumed taper of 1 inch per 8 feet, trim allowance of 1 inch per 4 feet]

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Table 16.--Log weights for scaling lengths of 34 to 60 feet: density index = 42 pounds per cubic foot

[Assumed taper of 1 inch per 8 feet, trim allowance of 1 inch per 4 feet]

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[Assumed taper of 1 inch per 8 feet, trim allowance of 1 inch per 4 feet]

LCG WEIGHT (KIPS#) FOR DENSITY INDEX=44

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Table 18.--Log weights for scaling lengths of 34 to 60 feet: density index = 44 pounds per cubic foot

[Assumed taper of 1 inch per 8 feet, trim allowance of 1 inch per 4 feet]

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Table 19.--Log weights for scaling lengths of 4 to 32 feet: density index = 46 pounds per cubic foot

[Assumed taper of 1 inch per 8 feet, trim allowance of 1 inch per 4 feet]

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₩ + W 4	- 0	200	0 0	07 4 77 2		W 13	n 0 0	u P	CF	() a	P- 0	ਦੀ U α′ 0 •	4C	ۍ «	9	Ω ·
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* O	re .	* 19	0 0 1 .	-0	0	Ω (SE S	- L	G 7		7 e c	7 = 7	0 0	0 h	0 L	1 (1) 0 1 (1)
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Table 20.--Log weights for scaling lengths of 34 to 60 feet: density index = 46 pounds per cubic foot

 $^{\lceil} Assumed$ taper of 1 inch per 8 feet, trim allowance of 1 inch per 4 feet]

LCC MITCHT (KITS*) FOR TEMSITY INDEXEME

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	17														

Table 21.--Log weights for scaling lengths of 4 to 32 feet: density index = 48 pounds per cubic foot

[Assumed taper of 1 inch per 8 feet, trim allowance of 1 inch per 4 feet]

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Table 22.--Log weights for scaling lengths of 34 to 60 feet; density index = 48 pounds per cubic foot

[Assumed taper of 1 inch per 8 feet, trim allowance of 1 inch per 4 feet]

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3						0 7	2		(i)	7 . 6	9,	0	. J) a	1	0
in in	-0	-	# #		7	5 . 1	5 ° E	5.1	6	9 . 2	9 . 2	0.2	1.2	C)	143	4
5.1	21.67	22.25	6.	0 :	0	5 . 3	6.7	7 . 7	9.6	3 1	0.5	1.6	2.6	P) [n 1
is is	0 1	. 1	> 0 V	n 0	40	0 0	. 0	2 C	T		1.6	7 - Z) i	ຄໍ່ພ	3 6	, c
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25	. 3	-	7	3	7	7	1 0 7	6.0	14 0 50	4 . 4	(F)	7 . 1	(N)	0,	0	+4
56		~	1 . 7	-	u	5.	00		40 5	0	7.2	4	C	9-1	N	P :
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n u		5	au C	m.	37		۰۰ دی ه	7) L 0 E +	2 0 0	No.		707			0 0	• 0
	0 /				0	7 8 7	0	-		4 4	-		1		,	

Table 23.--Log weights for scaling lengths of 4 to 32 feet: density index = 50 pounds per cubic foot

[Assumed taper of 1 inch per 8 feet, trim allowance of 1 inch per 4 feet]

LOC WFIGHT (KIFS*) FOR DENSITY INDEX=5m

INCHES)	t	9	æ	4	11	14	16	17	Q.	26	22	57	26	S 28	© №	(4)
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9	will.	10 C	6.67	0	3 9	44 1	4-1	44.4	77	44 4	6. A. C.	+14	-1 C	44 ((4)	•
~ ac	0 0	~ C	2 to 0	+ + + + + + + + + + + + + + + + + + +	0 0 14 4-		2 C	0 10 0	. 74	• H 0		2 0	. 20	F 2 .	27.6	9 10
o		12	146	1 -	1 0	10	3 0	1 1-	1 1	1 la	. 4.5	1 14	1 1	1	1	
10	7 1	73 t 1~ t 10 t	100	100	1.03		1 P2	P) W	3	1 2	41) LC.	01	r w	
11	d	. 19	.25	m3	m	3	3	3	2	10	U.	VC.	9	• 66	0	
12	판매 :	.23	. 29	[7]	4	3	43.	ti :	10	0	66.9	~	P	ac.	ಇ	
13		.27	193 ·	21.1	W 1	in.	ا ت	(U)	7	h. 1	00 (0	0	a ·	ايا	
14	01	• 21	T 17 0	Lr.	ın ı	0	\sim	~	ar	5	5		77	7	2	
52	N	92.	240	LE 1	0.1		Œ.	Q:	٠.	3 (-	(\sqrt{1} -	Ω.	M I	5 .	
16	U.	0 40 2	.53	4	N 0		2	2010	9"	2	M)	3	7 1	10	9	
17	- 1	€ .3: L	₩ C		સ 6 જ (*	N 1	1.2E	- 1	F (4 (\ (CC (- پا	
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5 H	Y) .		600	Ď.	e: 6	V -	2 1	0.4	0 1	٠ (ا ب ا	-	10	d: 1	
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22	-11	4 1 0		41			ا ه	2.0	9-4		u.	QL I	0	H 1	94	
50		- F	d (. 1	٠ ١	J ((m) [v.	*) (£ 0	X' 1		٠,١	U.		
54	با ہے	5	2	5	20 (43 6	31	d c	ω ,	7	7) (9	X) (•	
27	0 0	9 4	9 ~	0.5		V -	11.7	~ C		4 -	2 P	0 0	J	VE	4 0	
22	~ c		5 L	0	7	2		5 1	3 1	3 4		9 1	20	0	ulc	
30	n a	- 0	i u		9 =	0 0	3 0	- 4	^ v	0 3	3 P	9 U	0 0	7 1	V 4	
29	0	9 1	0 00	2 0	2 14.		0 7	1 4	0 00	. 0	2		9	3 6	9 4	
30	7 0	2 3	0	- 4	2 00	9 4		0 0		2.0	(C	, 7) 		4 10	2
3.1	0	1			1 ~1	عا: • ان		10	1 7	Q.	1	α	2	1 4		
32	4	0	63		0	3.77	·N	10	1	0	-	0	9	Η.	1/3	
33	4	~	2		7	0	LE:	T	<u>ا</u>	9	0.1	9 .	4	15	3	
34	0	or .	20	vi	9	0	00	w .	7	0	υ 10	-	P.	C	40	
35	ر ۲ <i>۲</i> ه	7	Ų,		0	122	+1	5		٠.١	0.	97.0	3	0.0	덕 1	9
36	3 1	-1/1	20	3	7	E	3 [٠. ١	2		2		U.	7		9 5
70	نا د ه	. 2			0 7	3 N		m+ ~	3 4	ri U		1 1	⊃ ∐ •	0 0 0 0) c	
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C 4) N	2	. 7	1 17	94	. 0		7	4 3	1 M	9 () (K.	9 ج پ د	- (Y)	10) t
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24	2	00	00	P~	9.	5	4 .	O	N.	° (∠1	ں • ء	0.0	1.7	2.6	3.6	-31
24	-	p	f p	r	ς,	C.	lu B	PF,	٠ ٧	9 P	0.0	1+4	2 0 7	3.2	4 0 7	~1
11	44 0	**	CUI	(0	0	20	f- :	0	1.0	F 0 T	2.5	6 . 2	00	4.7	TU.
45	· V	m	\$	5.48	ls :	10	9 6	TT 1	9 ° 6	S .	4.6	2 · C	3 . 6	6.05	Li I	W I
1 C	*)	7	0	-	0 4	0)			 •	eri a eri i	T,1	7	9	7) [2 0	~ C
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ית ניים	.7 "					1 1) L	Lr	† C	7 0 7		. v	0		00) (.
n r	. 00		2 0	7-16		. 1	101	1 2 7	0 0	1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	7 L	- M	7.5	1 80	0 6	3 94
52	00	0 th	10 10 10	7 . 24	000		1 (U) 0 (E) 1 (E) 1 (E)	12.27	12.06	4 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6	15.68	17. C2	18.34	10.65	0 10	22.5
5	1 1 1		4	1 U'	-		2 ° f	1 F	17.	0	(4)	7 . 7	0	9	1.6	107
54	1/3	0"	N.	0	4	0 .	200	500	100	500	6.9	e 60	9.3	1.5	2.6	9.7
55	6	~	ď,	0	3	4.7 4.4	0.	1.	•	F . L	7 . 5	0.1	ر ۳	7 0 7	17	3
56	1	q'	10	į l	*	0 1		C + 1	500	C . F	60 7	۵.	A. 1	F . 3	7 . 1	Li
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50	3 (7 77 0	0 1			3	0 5		,	7 0 7	0		100	ζ,
F. I.	3		Ċ	d	,	1			P	0		0			. 0	C

Table 24.--Log weights for scaling lengths of 34 to 60 feet: density index = 50 pounds per cubic foot

[Assumed taper of 1 inch per 8 feet, trim allowance of 1 inch per 4 feet]

LOC WEIGHT (KIES*) FOR DENSITY INDEX=FS

								CONTRACT	T FOND I							
DIA W. T. P								SCALING		51	-				:	
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٩	3 +4	970	+ H						12	•		40		C.5	U W	6.0
	6.53	Cu 10	67 L	. 50	500	• 22		22.	- r	۰	DOLD	011	• G-10	* C *	e T (• 17
00	200			3	3 7 0	0 3	이 -	0 0	9 4	0/2	ol.	1/12	6 5 1	이글	이 ~	V =
) T	0 1) C	, T	0 (X) P (L) O (0 0	2 L	T L	15	7 4	4 10	1 1	2 C	t 40	1 4	ک ۲
7 7	. 74	1 . 12	5	10	010	~	, CL e, e		0100	. C	α,	, =	. 60	0100) 40 * *	9 0
12			7000	20	000	4 0	٠,	3	- 1	G.,	- 4	.3	7	4	71	च्मी। का
13			T + 1 5	3 4 4	1.	1.		6	~		100	la i	Pr :	2	7.	7
14		- 60	1.37	2	1046	1.5	47	-	u.	2	9	9	9	9	7	7
15	-0		7.65	ا ا	1.70	erl (a		(C) +	200	g (0 1	3 P	9 -	٠.	0 -
15	2 6	0 1	2 P	 	m //	- 1	- 1	9 4			2 5	0 P		3 7	1 0	± 0
~ 00	r_	· ·	7 , 0			7 4	0 1 0	- 1-	2,31	C) (3 0.		رم .
19	- 1			-0	7 0 2	4	- 1		1		7.	ک ه	W.		-	*
20	0	- 0	j ==1	1	36 00	1	0		1	7	7	- a	7	03	C	Pr
21			7 · 51	12 F	7.7 C	0 1	U.			101	1	(1)	4.	~	ap .	δ.
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2 2 3			. 40	; () † ()	, C =	3 P	. ~	0	. (* a	Ť .	<u>.</u> .	. 1	10 E	ک ر ک ک	- α
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26.0			7.007	T E	- 1 	, v	0 0	0 40	0 0	9 7	ب م • •	9 4	9	-1 oo • •	. c	. 0
10	1 .			Ç.	5 . 0 .	F . 7	-		-					2	i a	Q,
28	0.1		290,	ڊ پ ت	7.002	7.5	4		2,	PC	123	ان: ا	=	9.3	3 ° b	5.0
57		0	7.15	~ 5	7.70	⊕ (1)	L/J	9	1	0	2 = 6	9.6	а. О	0	(*)	: :
3 +	70.33	500	F. 4.	J -	R. 30	9			M	01	1 C	U . 3	9.0		कर्म कर्म इस्में (100
T 2		0 1		. د				0 1	, 7 e i	0 1	•		9 6		. C	, , ,
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ž 3						J	. [-				. I	3 ~		# 15 # (2 2
	٠		14,25	7007	15.62	16.2	16.62	w 0		. Cι • •	* * *	. 7	ے د ہ پ	0,0	7 .7	. (II) 0 0 2 771
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2.	5	Tr.	13.886	2500	17.33	0. #	77 .	0	0 · 57	0 3 1	υ.	₩ .	ر الراء الراء	00	: لد دم	M/ (
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i.s	1	± .	115.23	J. 14	300,6	5 . 6	ro		9 0	50	6 0 5	5.1	0	F . 7	10	M
27	1			3		**	-7		t	0		* 1	6	7.	α. α.	0
_ 0		, , ,	V . V . V	7 - 1	26.71	7 °	3 3	v, 1	2° 0	2 C	7 0 7	7 . 0		\$ h	700	100
. 6			1000	0000	74.67		1	1 2) (\ = e	r ()			2 - 2	4 Pr	0 0
	1 11					8	1	, *	0	3		10.	1 15	- C	9 7	(L)
	4			a +	0	*	1 0	2	5	7 0 7	7 *	C	1 + 17	0	6.1	7 . 1
√ FV		~ +	2 2 4 2 5	2 0 0		a. U	3 C	6	C 0	10 0	ر ۱۳۳۰ ۱۳۳۰	4.7	37 C	€ 0 € 0	7 . 5	80.7
٠ . و			7 7			2 0 2	700	4 (4 F	 	0 0 1 10		0.4	7 (9 C 8 1 1	2 0
	`						7 ·	o e		0 4 T	0 0	7 4 5		. + . • 	5 -3 9 * 5 *	- A C
(3 14)		-		- :	. 0		, , ,		3 0 12	, 17	7.0 . 4.3	6 , 1 o	23.00	# 5° 7#	44016	4 7 . 6 5
5.7		-	23.99	970	-	3 0 77	(U),	ŝ.	4.	20	P/ :	1.07	e 7	2.5	\$.	7.2
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P), e														5	

Table 25.--Log weights for scaling lengths of 4 to 32 feet: density index = 52 pounds per cubic foot

[Assumed taper of 1 inch per 8 feet, trim allowance of 1 inch per 4 feet]

LOG WEIGHT (KIPS*) FOR DENSITY INDEX=52

(INCHES)	4	'n	80	10	12	77	46	17	18	20	22	54	S 8	28	3 9	(10)
ų	***	- 0	100		7	7				4	4	7	4	4	4	4
10	ت د	24/2	3 -	3 +	-1 +	٦ -			4 +	0 0	0.10	* T *	40	0.14	40	-40
- 00	0 0	0 C	.13	3 40 H FH * •	1 (U)	4 P.	- PO	 (7) P	4 6	. 26	3 00 4 (V) * *	* 29	J ≥ •	ਹ ਵਜੇ ਹ 190 ਵ ਵ	U (V)	(M. (C)
6	(C)	dud	•17	N	(V)	N		. 21	(M)	143	120	رم رم •	. 41	.42	3	-3
10		.16	.21] £ 0	• 34		• 39	3	44.	74.		• • • •	.55	. 57	13)
11		C/J	10 10 10 10 10 10 10 10 10 10 10 10 10 1		C7 C7 0	# :		0.70		m.	50.0	£2	<u>।</u>	• 69	*75	-
12	-1	N	• 34	۲۶].	.44	In I		0	0	0	.72	P 1	∞	00	αij	0)
. 3		0 0 0 0	(D) (7 1 0		ru i	9 0	• 70		න ද ග (<u>د</u> و	4-1 C	g ,	1.02	1.67	ના [[]
14	V	~ [I	240	2)		-1	~ ı	28.	$ \infty $	5		2		V.	Ν.	
15		. 37	1 :	ه د ه		ei f 30 (6		J .	ા (□ ૧ ા	ت د •	ا ا ر	N -	Y) i	4	31	ů.
16	V I	31.	000	0	20 0	3	٠ ا	2 0	ed I	V.	3	3 1	U.	0		φ.
17	ו גיו	ar . .† l	00 t	_	9- 0	in C		N .	n.	3 (0.1	9 4	/ .	20 1	တ <u>ှ</u>	യ ! •
80		10	071	∞ e	C)	4	9 . 1	7 1	1.60	9	20	00	9	٠.	N 1	M)
19	j.	Ω.	6/0			٧> .		u i	0	ю. •	2 (NI (* 1	4	ب د
Sig	3 1	011	000	2	7	3			ac	3	7	*	ů	9	2	2
21	Ln.	074	0	4.20			1.00	0	٠.	. 173	77.0	CD m	α) #	6	-	(M
22	u l	CC.	9	P)	E.		2	7	N	7		0	4	3	8	9
[2]	Ç)	00	ď	3		# O &	D)	(1) (8)	3	7	σ:	۲.	4	9	8	c) •
24	اک		ru I	15.11	D	ا ا	J	n	N 1	0 1	7	5		0	N	7
25		9	M)	N- 1				00 (0 1	(V) (ا بكا	α) ·	다 : 작	M) I	. پ	αΟ 1 m
26	-		5	20		0	α.		N.	5	20	다.	7		၂	2
22	CC -	4	<u>ر</u> ا	2		- 1	2019		7 1	ω.	÷ i	ا القا الله	0C	#네 :	7	· -
00	0	*)		<+ l	0			١	-	디	٠.	α.	2	U	ا ان اھ	2
29	Q.	才 自	70	po.		N	e e	α;	c.	4	00	(/)	υ V	э.	P .	- 7
30	5	5	9	10h	0.	3.43			ro l	-	2	9	6	ا افت ا	00	2
FT 19	ာ . ခေ	9 1	٠,	er.		un i	eni .	3 1	0	۲.	φ. U. (Э.	3	o .	(1)	0
32	4 4			r	~	0	7 1		C I	3	0	2	9	1	C I	Y) (
M .	J I	a((4	0.0	0 1	end .	~	ا ب ه	N i	00	M 1	0U 1		σ.	M (ας . •
7 1		3	* L	11.	0			, d	o la	J'U		3/1	e P	t C) L	3 C
7 7	T C	4 3 L	- C	r u	, 1		. J		F: 1º	. 0	9 4	~ (°	, α •		e e j	b c e u t.
37	P			10	. 4	. 0	3 6	J P	1	• 14		1) =1) P
- 00		2.46	3 . 25	さった	4.87	1 H1	9 M1 9 M2 9 B	6.71	7 ° ° °	7.001	000	25.0	7 TO	0 0 0) (Y)) (J1 0 0 1 77
39	1	10	7 0	IN	7	30	9	- 3	1	2	C.		.5	1.2	10.0	2.6
- C3	or,	7	w)	- 4	12	67		7	α	L.C.	7.	(7)	(C)	00	2.6	(2) (2)
41	0,	CI.	CL .	1	0	۱۵۱	7	00	N	+1	C	0.	15. 44	r,	5	3 8 17
2 +	3	3	C.	おい。す		(C)	-1	0	1	u.	Lí -	**	2.5	(A) •	0	4.7
M t	7	44	۲4 0	N		T	. 1	9	mp1	C) #	. 5	1.9	2.9	3 = 7	400	in in
+ 4	0	[C)	4.53	7				۲.	n	01	년 *	73.	6. 17.	7	10	ري د م
45		-	2	: -	0	Υ .	O,	-7	- J - 60 - 3	0 0 117	2.04	10 10 10	7	e-4 4	# T = -	-
949	7	D	-	O.	end B	0	1 578	0	1	1.07	2 0	(a ()	30	ا ا ا	00 H	0
17	rls •			. 3	† •	Ψ.			O	44 (\)	٠٠. د م	*	4	500	7.0	α -
6.3	0			1		J)	C	9	7	٠ د	() ()	L.	0 0	7 . 3	9	នា
o (-	- t	17 0	P-	· ·	4) [٠ ا ا	7 e 7	0 -	년 (1 10 11 (2)	ন ব ।	0 i	ກ ເ ພ ເ	ാ പ്	ου Σ' ε	3 1
50	X (9	3 2	7	0		1.	100	000	9	0	90	(D)	0 0	9 0
7.7			. "	4 4	. "	~ E	11 0 11	7 6) : U !!	• I :	٠ ا	•	r (. 1) P	0 1
20	* -1 · U	• a	4 1	0	4 3	•	0 0) i .	9 = 0 = 0 =	• L	. 0	- 0	α ο	1:0	10	1 6 7
2 2	J F		J.		0	3 J 0 1 Y) L 0 P) r.	5 L	•) (. 0) (2) (3	4 C	, L b J [r	با - و 1 ل
t u	. 7	. 7	. 4	2 60	• [1 1	- 1	• 1	3 70	1 14	. 0	0	0 0		74. LR	. U
7 10) P	0 1	1 0	e «	i jy n e	1		4 G 4	0 0 , h.	4 % Y D		110	14	7.40	W
57			110	1.		10	11.	la La	11.1	r		-	11 -1	1. 7	2 E + 3 5	, P
S S		2077	7.655	9.53	11,38	22.51	1F , t.4	υ υ	7007	10°67		22,16	30.52	25.62	22.12	25.01
58	1	G.	0	20	-	7 . 7	45.57			0	10.0		1. 3	L	0 (
2 1					9		1 / # / T		ŀ	7 4 7 7	07070		7.0	0 = 0	TO # 0 7	

Table 26.--Log weights for scaling lengths of 34 to 60 feet: density index = 52 pounds per cubic foot

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* 1FIFEL FULL

[Assumed taper of 1 inch per 8 feet, trim allowance of 1 inch per 4 feet]

LCC WFIGHT (KIFS*) FOR DENSITY INDEX=54

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Table 28.--Log weights for scaling lengths of 34 to 60 feet: density index = 54 pounds per cubic foot

[Assumed taper of 1 inch per 8 feet, trim allowance of 1 inch per 4 feet]

TOO WITH (KIESW) BOD CENSILY INDEXES

(INCHES)	24	t						-								
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2	9 5 P	2.62	52°C	7.	Œ	2.96	0.1	3.05	1.	5	N)	47	7	50	10	9
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			1 1 0 7 4		١ -	4 C.	1	, .	1 d	7.) (.	. 1	(C	100	/ °	5
19	499	75.416	2,167	10	P-	100	-	-77	500	6.6	L-	8 . 4	7 . 6	U + 3	1.2	2.0
, ,					P -	-7	Page		6.8	7.8	9 . A	9. 4	£ .	1.	500	3 6
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55	24.	20023	27.61	400	C.	-	6.5	0.	80°	9 a 3	1.5	2.6	9 6	407	507	မှ မ
° .	5.0	24.64	24.63		0	G., (GL v	G s	ğ ,	1.07	0 1	G	5 1	V 1	7 . 3	4.
1			, s. 5.		~	U .	- 1		5 1	eri . • *)	· ·	្ត សារ	0 0) •	E .
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						-3	po	1	7 0 2	C	· M	1 2		1 3	100	200
, 9								~	C . D	17 0 7	C	. "	4.8	C. 5	7 . 7	(C)
				340	11,0612	.701.	340 82	7 % pt	11.10 th 7	41.49	43.65	450 (44.57	48,06	400	51.6
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		7 - 9 1 ~		0 1		, ,			400	0 1	2 e	بر ص		100	*) (
	0	9 1 0	***			470 4.1	٠,			, ,				9 . ,	0 . 0	0

Table 29.--Log weights for scaling lengths of 4 to 32 feet: density index = 56 pounds per cubic foot

[Assumed taper of 1 inch per 8 feet, trim allowance of 1 inch per 4 feet]

INDEX=56
DENSITY
FOR
(KIES*)
THOISM
90

RGE E								SCALING	3 LENGTH	4 (FEFT)						
CINCHES)	3	9	60	10	12	14	16	17	18	20	22	54	26	28	(c)	32
9		113	0	0	quel		- +	444	94	74		q-d	.15	. 15	qr-i	44
⊳ a	9 C G	α0 + © τ	ल्ला इ इन्स्य क	• 13	⊕ €10 €2 €	16	* 138	• 19	0.1.0	35.0	. 24 24	. 22	2 2 1	• 24	* 24 42 °	• 25
0	3 40	4l	4) 🖛	4 0	3 1	J N	u Pri	4 141	J M.	ul M	াব	2 43	이크		oi 4	7 3
10	.12		101	.27	(M)	m	3	-31	4	3	· m	. 10	• 56	. 59	· 40	• 63
루 (44.	0.1	DJ I	(*)	PD.	31	86° 1	W i	in a	(A)	(C)	9	P- 1	P- 1	S- 1	Φ :
2 14	-1 C	Niln	N C	3 3	1 U	IN N	SU P	5	010	- O	~ C	00 C	0	0 4	ਨ _ੇ ਪ	0
77	A M	n M	フ ゴ	r in	n cn	D P	48.	- 00	~ 0	• •		• •	> C	\vdash \bowtie	4 10	2 7
15	ıĮΝ	1.4	IN	0	1	. 8	U	E .	9	7	2	1 177	1-5) IIO	9	9
16	143		Φ.	47.0	.87	С •	4	4	6	6.5	4.	S.	9	P-	(C)	တ
17	[M)	ILD.	10	00	(J)	1.	ς.	(A)	4	r.	9.	. 7	0	-3	જ네 B	2
1.6	1.3	13 8	N- (01	7		7 1	L I	ال	~	α,	3	₹.	MI	4	50
2 6	1 4	0.6	x Q	1.17	1024	2 5	1 5 6 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7	~ C	1000	3) 4-	H M	N U	1 1	U 0	~ L.	α
21	កស្រ	100		ع ا	> 17.	1	0	١.		1 -3	2 4	α.	- 5	0 0) _1	a LC
22	LD3 /	m	. 4	1 5		0	0.0	1 177	1 4	9	6	, 💬	: M)	1 10		0
23	S	100	0	10	a.	1.	4	5	9	0	0	7.0	9.	0	1711	2
54	P~	mi	M	N	9	0 [V]	W .	2	6	2	5	-	:3	M	4	8
25	N 1	C	3	CC .	0 0	ru L	್ಲ ⊤	ED F	덛 :	្រ	© ₹	런 :	4 0	F	ω .	N ≥
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36		ır.	7-1	(0)	○I	~	- q=4	ţ.	٠.	4rd	9	ं	5	01	١٠.	00
무명 (Y)	175	2		or.	4	0	70	7	9	ro.	3	5	CD.	4	0.	6 5.3
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† ហេ ហ ហ	# 45°	-4 C.I	• i •	2 6	4 50	. 7	9 15-			0 0	0 0	0 00	3 (J)		* *	+ C + 3
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4.5	₹.			(1) (1)		17	14.5	α,	0		1.3	2 . 2	4	40 7	0	0 1
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42	3 .0	s le	- O	900	P M	1 3	4 4	- C) N	1 0		0 4	0 0	9 6	· [*	8 6 4
9	W o	00	-	.5	(U)	- Ω	0 0	1 U	1.2	4	(O)	00	0.0		8 e	0,
24	10		, a	5.7		V.	17 s	101	o • ₹	(m.)	1	40	1 ×	7 0 3	о В	
24	ac. i	CAL	(2)	O	la.	9.6	100	1.0 €	200	3.6	0.	6.1	7 . 4	8.5	0	1 + 5
O .	2	+ 1	o .	in	_	T .	-7 L	2.01	011	2 . 7	10 1 10 1	00 L	다 ())	-dr (000	en o
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7 0 10	U M.	(7)	40	10 ° 00		. 7	1 0	1-	· ru	T C	9 LG	9 0	. 10	4 C	1 -3	ာတ
53	-1	1		1 13	10	60 0 1 971	300	4.0	3	0 . 6	. S	9.8	₩ ₩	2.9		0
57.4	0	Dr.	4	8.38	₩ •	0 0	7 0 47	± 0	5 . 6	7 . 3	8 . 9	9 0	2.2	00	S .	6.9
50	1-	0	3	W	100	207	0.0	7 ° 6	A . 2	3 .	2.6	100	0 0	4.7	9	7.9
56	(2) e	N !	9	11)	104	200	3 . 5	u i	8 1	(C)	3 0	0	6	5		0
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					batesin			f s								

Table 30.--Log weights for scaling lengths of 34 to 60 feet: density index = 56 pounds per cubic foot

[Assumed taper of 1 inch per 8 feet, trim allowance of 1 inch per 4 feet]

LCC WFIGHT (KIPS*) FOR FENSITY INNEX=56

LARGE END	and the second second	Application of the many area				And the second s	The state of the s	SCALING	C LENGT	TEET H	To the same of the	***			Viviennishee	1
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<u>u</u>	्र स्त्री :	•	41	• 15	quet	- 44	.14	4-1		apart.		• 12	4-1	44	44	(C)
Να		· ·	. K		6 N	42.	• 2 t		.24	• 23	14 N	* * 22 24 25	. 22 44.	• 21	(3) (4) (2) (4)	ਰ M ਦੀ M
5	1			.51	10	(C)	250	LL . 1	101	10 1	15 1	. 52	100	110	li Line	100
- 17		1 7	4 3	5 0	T, at	-10	0 7 1	. 0.2	V 0	~ 0	N 15	. 72	N 0	N- 0	P- 0	P- 0
16		.P	, , ,			9-1	-	1	, 4	0	. J		. ~	. 67	. ~	. 0
44 £	4 +	1000	3 4 -	11) () -4 +	141	~ .	1.62	111	41 4 41 4		() () () () () ()	1.52	ه دغا ا	10	411	147 (
3 €	0 1			0	5 0	. 0		١.			T T		α (١٦	١
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5.4	4	17.	1 1 1 1		C1 1		71 0	× 19	0 1	(*)	3.1		L o.	٧ 	~	2 *
			H 11	0 9		P C	0 60	1		ar t	C -J		36	1 1	~ a	m a
2.1	10		1 0 0		7	3	-37	L	2	0	0	- a	퍁	100	3	5
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27	٠ د	UT 13	S. S	7.16	3 .	-	ے بد	P	~	L C	a (M) 4	υ υ	ψ., σ.	3
500	. 6	7.32	300	IV.		3 6	. 0	- 2	1		0 4	5 0	4 6	2 0	2 4	. 4
اما (ا ات ر	V. (] (-1) ?) (2	9 400	50.7	1	. 7	- C	• •	- Li	n α • •	1.5		2 (C e e 4 F 1	2 0 0	. 5	9 60 9 4 1 7
+ 1	7	r :	1.66	2.57	S	C, ,	r .		1.7	100	21	10	2 . 7	LA O	3.6	0 (7)
2	F	17		4 7 7	1		2 0	- u	200	9/2	0 0	0	101	7 7	7 0	7 U
) 3	1 12) T		7 0 0	7 . 7	9 10	. Z	1 0		* *	- F	f . 1	ν φ η υ	7.0
5	4	11.7	0	L	7	, t	, C	7	10 7	L7	1-	6.	6.7	7 . 2	7 . 7	8.1
w 16		7 . 4 4	0	4 2 9 7 4	0	7 · 7	4 1	e (5	0.0	100	1.0	7 . 9	₹. 3	A .	ו מי
_ 00		13 - 10 - 10 - 10 - 10 - 10 - 10 - 10 -	· ·		0 0	0 0	7 . C	0 0	7 .6	7 . B	0 00 0 00 0 00	000) T C	2.0	1 . 2	1.8
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м.	7.6	***	3	1 40 1	2 .	C 1	1.7	0.1	₩ ₩	E .	4.	L'	9	7 . 1	7.5	8
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_ 0		6		23.5%	21	0 3		P .	0 0	a e	5	0	1.9	5.9	ٽ س	A . 17
e o	000	22.47		3,40 6 3		A 0	3 0	u C	el -	- c - c - c - c	4. U	~ (V)	47 C	70 77	1 2	m, a
0	. 2	54.90		25.82		- M	. 0	. E	1.7	. 6	40.4	2 10	. 77	7 . 6	-1 P	• 00 • 07
1	5.5	56.62	1.0	27.96	0	10	1.5	1.0	30.7	7 0 47	5.5	9	0 0	5.2	4 . 0	9
2 2	9:5	27.03		20,12	3 1	4 3	01-	3.62	1 c	0 1	707	70	9 1	6	20.1	1 m
. 4) o 6	29.24		- CO		10 1		. C		. G.	2 C	9 d		0 4		0 0
5		37 , 39		37.05	110	i di	1.4	, M	9.8	0 0) (pi a g evj	7 0 7	1	10	0
9 12	000	11,50	0	34003	W)	7 . 2	- E	0. 0. 0.		1.9	27	50	ा ।	7 . 9		5 .
\ 30	1 ×	17.00	· ·	20 20	C P	ت ن • •	7 0	(U ^	6 .	E . T	· 11	9.	C	J 7		~ (
6	3 EV	34.17	20.00	37.92	7/ 62	ຕ ໄດ • •	2 C		2 - 0 -0		1 1 0 0	• •	1.0	. J	• 11) J • •
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* 1KIP=	13001	CLRBS														

Table 31.--Log weights for scaling lengths of 4 to 32 feet: density index = 58 pounds per cubic foot

[Assumed taper of 1 inch per 8 feet, trim allowance of 1 inch per 4 feet]

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A GGE E								SCALING	LENGT	H (FEET						
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9	47.*	90°	.08		थन पूर्ण •	4H (7)	133	.1	-	• 14	**	. 15	.16	• 16	• 16	.16
P- 00	900			€ 4 • 4	변) L 판매()	-17	60 E	. 10 0.10	350	. 21	*25	* 53	• 24	60.00	67 k	. 25
6		0.14	113	4 0	36.	1 E E	1 17	a Pri	J 84.	0 2	7 7 7	24.	1 4	미크	0 3	ol u
10	. 12	• 13	523	l (VI)	(15) (54)	* 37	24.0	-3	- 31	64.	100 101 101 101 101 101 101 101 101 101	. u	· IO	· w	r uL	i W
11	· 15	.22	e 23	(A)	4 4.3	360	#1 (5) *	111	LO	* £1	\$ 0 th	9.69	1	1	8	80
12	• 18	• 26	400	-7	079.	• 56	29.	147	ol.	· • 74	. 8 .		GD.	on	Q.	CO
Y2	. 2.2		6 P	J 1	وں و ان ر	9 P	47.0	r- (00 0		5		್ಞಾ	+11	THE .	N.
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17	a •	100	.75	- a		1 1	e a	ניין ט	و ان	ei e	100	0 0	- 0	0 0		٠ ١٠
18		.63	• 79	Q.	4	1.32		LEN	40		G.			1 147	1 121	φ.
19	.45	.67	.88	0	N	1.48		- 2	lac.		2		(A)	0	90	ים
2.5	10.	.7.	e G e	L/J	-2	1.65		0.	(3)		7.		αr αr	(2)		(אן ו ש
21	9 1 6	° 92	1 • 5 B	Pr 1	ru	1.93		7	eu .		-		딕	(M)	117	1.
22	•61	40.	1.19	26	-	* 1		3 1	ro II	- 61	0	0	7	9	0	뻔
500	\U.	m .	1037	.o r	5	12.0		ىن دە	P 6		Y)		00 -	m .	M 1	ru .
47.0	v / 0	4	つまって つまい	~ C	7	6.41		20 1	O 1	-	9		7	1	-	٠.
25	σ · α		1 • 1 • 1 • 1 • 1 • 1 • 1 • 1	ν α γ = γ π = γ	V J	0 K	9 (M 4	V 10		2 1		ຄຸດ	M OX	el u	3 0
27	200	F 4	1 0 31	10	Œ	1 C C C	p} =		V CC	e 4	2	n 4		21	7	1
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59			2.13	10		5.57		iV.	12		-3		2	1 1	174	n,
3.4		- 0	2.25	1	Lt.	80 e20		£C.	00		σ.	- 40	!	CV	ų.	0
31	1000	- 00	700	2.30	r.	C. T. o. 17		O.	-1		5		01	1	·	9
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o` . ~n d	(T	- 10	a a a		G 0	m 1	0	C, 1"	N. P		- 2 ty	٠ ,	71 C	10 0	2	- O
7 -7		B (2000	10	20	7.57	0 0	2 5	-la	0 U		1 6	9 6	* IA) () (†)	یا ارد بارد غار≿
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(°)	00	10-	40.00	71	0	2000		Q .	44 0	44	N .	(N)	7 0 4	100 m	(c)	7.3
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24	ر. ه •		α μ.	5.94	. 0	0.54	. 0	U.	200	J IV.	1	9) (V)	rigi rigi	9.6	100
©†	0		Pe	7.24	- 10	(C) (C) (F)	- 0 - q		2.7	3	†	e C)	ت و ري	C . 3	13.1 0.	00
on .+ (. *	5 5 5 7		W	4-1	2) # (V)	(A)	3	2		φ 	1.01	707	507
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o 16	*	91			*	4 T	5 11	, , e 7 (1 0	٠.	I =	* :n e	, r	(F) (4)	1) P	407
27 7	1 3	6 .	24.5) I.	•	1 00 00	• · ·	. 0	. 15) [-	110		0 F	7 8 7		α • u
) 1	1 .	0 4	-i		0 *) p) c) t) t) +	P B B B B		· r.		0 0 1 eri	-1 	. : 		0 0
55	J.	- 4	6.50	3. 24	10	13,24	i a N	0 0	0	1	13	w Uz,	(a)	(S)	10	0
56	-		1,69.	100	41	C. P 9 7 7 7	Li.	3 * 3	704	٥١	***	10	4.07	15°	0	100
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Table 32.--Log weights for scaling lengths of 34 to 60 feet: density index = 58 pounds per cubic foot

[Assumed taper of 1 inch per 8 feet, trim allowance of 1 inch per 4 feet]

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* AKIPSALOG FORMES

Table 33.--Log weights for scaling lengths of 4 to 32 feet: density index = 60 pounds per cubic foot

[Assumed taper of 1 inch per 8 feet, trim allowance of 1 inch per 4 feet]

FOR DEMOTTY INDEXAGO	
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Table 34.--Log weights for scaling lengths of 34 to 60 feet: density index = 60 pounds per cubic foot

[Assumed taper of 1 inch per 8 feet, trim allowance of 1 inch per 4 feet]

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[Assumed taper of 1 inch per 8 feet, trim allowance of 1 inch per 4 feet]

LOC WEIGHT (KIFS*) FOR CENSITY INDEX=62

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12	ф. 64 Ол.	200	• 36	3	w	8	0	.70	P-	° 7 °	70	0	0	.3	C .	74
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Table 36.--Log weights for scaling lengths of 34 to 60 feet: density index = 62 pounds per cubic foot

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LCG WEICHT (KIPS*) FOR DANSITY INDEX=62

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Table 37.--Log weights for scaling lengths of 4 to 32 feet: density index = 64 pounds per cubic foot

[Assumed taper of 1 inch per 8 feet, trim allowance of 1 inch per 4 feet]

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Table 38.--Log weights for scaling lengths of 34 to 60 feet: density index = 64 pounds per cubic foot

[Assumed taper of 1 inch per 8 feet, trim allowance of 1 inch per 4 feet]

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[Assumed taper of 1 inch per 8 feet, trim allowance of 1 inch per 4 feet]

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Table 40.--Log weights for scaling lengths of 34 to 60 feet: density index = 66 pounds per cubic foot

[Assumed taper of 1 inch per 8 feet, trim allowance of 1 inch per 4 feet]

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,	, n,	1.5.7		-	. 13	1	. C.	p (0	1		4 Q #1 4	. (1	- (<u>C</u>	o
0	4 -	7.07) (0.00) (j)	0 7 2	. 0		نا . • •	0	10			0 0
7	12	7.89		3	1	7	1 17	9,46	1	0.1	700	0.7	100	1.2	1.5	-
മ	34	9.54		44	IC.	80	0.0	3	9 0	0.0	•	. e	1.9	200	200	12.
3	66	9.21		8	3 . 2	9	3 . 8	-	1.4	00	2.5	2.6	2.9	M (1)	3.6	(14) (14)
3	60	20.0		9	7	(U)	C- 1	-	2.3	0	201	10°	0	A 0 44	407	121
	500	1 .59		3 1	L .		011	0 1	M) .	7.00	2007	ا ب ا (ا	ب بن ا با) T.	ທ 1 ສ	ء ت
7	7	T oth		VI.	100	017	* 1		7 0	5 1	200	1000	10	0 0	000	-10
າ .ສ	(C)	40.00		. 0	• 1	 	• 4	7 U	9 0		9 0	0	- a		0 0	0 6
. rv	12.0	1.011				4 v4	7) (L	0 10	0 0	. A.	0.0	0 0	0.3	0 0	0 0
2	21	160.6		1-	-7	7 . 1	7 .	~	A . E	9.1	7.6	9	100	1.6	2.5	12.
1	16	15.65			7 . 4	2 0 0		8	9.6	6.3	1.0	106	2 . 3	2.9	3.6	24.
89	477	16,45		- 61	304	000	906	-	0.7	1.5	202	200	3.6	403	5.0	25.
σ·	7 .	17,35		13	U .	0 3	107	4	100	2.7	3.5	403	* L	ec .	0 0	27.
0 7	00 0 00 1	13034			1 0	100	100	3,0	0 0 10	10 ° 10	9 0	10°	0 F	7 . 3	3 0	2 CU F
40	1 0 0 a	10001		- 0	• 0	0 0	0 0 7	0 3	† a	0 6	0 0 0	- 0	, C	0 0	D (3 0
2 6	0 2	7.100		3	0 1	0 6 0 L	0 G 0 G 1 LC	9 (C		0 8	0 0		0.0	0 0	200	3 2
. 4	86	22.44		-	10	- (*)	0 0 9		00	0.0	9 0	9 6	9 0	1 10	4	e e
2	17.	1			5 . 4	7 . 5	a a	~	0.0	1 . t	100	(7)	4.8		5 . 7	370
9	22	24.64		10	7.7	8 . 9	0.0	0	1.3	2.5	3.6	8 . 47	50	7.0	8.1	0000
7		1607		- 0	° c	ر • >	0	- 69	200	0	5 . 5	6.4	7.6	S . 3	6.0	6 7 0
8	5.54	26.94		0	n . 3	1 . 7	0	PO .	40.3	9 6	5.8	8 1	9 3	9.0	1.8	4 30
	940	28.13		V		- 1	eu (34. 50	Œ.	CV (38 · 56	α,	4	4:	-	44.
7	200			al.	ار دار	0.0	200	مام	300	E L	200	T . D	300	2 0	10 P	0 0
10	, 00	11,85		. 1-	+ 10 - 10) C	9 6	• G	0 1	0 0	100	0 U		0 6	0 0	1 11
2	3.21	, 7 %		7 .	700		0.0	c	1,67	1/6	10	1	P . 7	ار د ار	1.8	5.3
1		14047			0.0		1.5	0	1 * 3	1 0 3	7 . 4	0 .6	7	2 . 3	3.0	S S S
77	2 11 0	71 + 11		-	4	0,000	(A	3	5 . R	7.5	P7	106	202	40 6	9.1	20
9	220	37.1A		- 0	0.0	2 ° S	d . 47	10	706	700	1.5	3.0	4 . 8	6.5	80	9
2	٠ د د	30° 13			0 1	in i	5.5	2 0	400	() ()	2 9	0 .	0.4	N- 1	0 0	o (VI -
20	70	41.00		-0		7 ic	20 (:	0' :	1.5	M L	000	100	9	6 0	201	9 T
7 =	n :	04074		•	0 0 0	7		•	> 0 J	in a	100	1	0 0	V	3	0

Table 41.--Log weights for scaling lengths of 4 to 32 feet: density index = 68 pounds per cubic foot

[Assumed taper of 1 inch per 8 feet, trim allowance of 1 inch per 4 feet]

LOG WEIGHT (KIPS*) FOR CENSITY INDEX=68

RGE								STALING	C LYNGIE	T (FEET)						
DIAMETER (INCHES)	-3	9	8	77	4	14	16	17	18	:3 60	2.2	24	26	28	3.5	5 22
φ	ເກ ເວາ.	.67	60.	चून्ये चून्ये क		4.6		9	•16	- 47	90 14-1 0		4-4 0.0	• 19	۵۰ دا ه	919
2	19.	yel	• 13	E	• 18	•20	. 22	e 23	.23	. 25	.26	• 27	.28	• 29	• 29	9
00	3		*17	cu l		N		P2.	•35	45.0	• 36	m	040	0.47	240	. 43
σ c	CV - 1	2.1	010	4 CJ	다 (이 전 이 이 이	10 d		JU	* F	• -1, ft ft/ a	9 47 40 80 80		ru a	• • • • •	553	910
7	4	10	. 20	3	94.	١		63	999	.72) I~	2 a	000	- 0	- 0	26 0
12	CV	NO.	.4.3	64.	.57	40	*73	-77	600	. 60 - 4	760	<u>ت</u>	(C)	님	1 4ml	1.20
13	N.	143	647	LC.	60.	1	Œ.∵ e	5	• 96	-	रून 0	6	(V)	·	4	1.45
14	CVI !	#	.55	0	e .	0	ಬ	9	1.13	0	2	7 .	5	77	9	1.73
4-4 - [12 (P) [J 1	79.	00 (O, (0	रम । •	. [7]	역에 : 100 년 명 역 기	.0	rc I	9	2	φ.	ω.	N 0 0
16	Y) .	is h	000	20 0		0	ן ניי	7 .	1.5		7	0		ન -	2	2.36
G	3 4	0 1	700	> Y		0 E	n r	p a	T 0 7		ລຸດ	면 2 **	4) (i	4 5	ů.	2 6 7 1
10	r LC	- 1	□ (4 0) U	1 1	. 0	• 0	1034 2.47	• 1	A L	1 5	0	• *	2 1	3 14 30 4 30 4
10	n in	000	r 10	J -7		0 0) y-	⊃ [Y. e 4	2 . t. 7	2 to 00	00		• M	٠ . ۱ س	4 C	3 17 9 6 1 0
21	130	0		12	00	-	70	U)	2.69	il e	2	7.	9	σ	1	4 . 35
22	Per	CD	- 6	P	0	P)	9	00	2.96		S	00	(II)	P3	· (7)	4.83
23	~	7"		30	6/1	e N	a,	-	3425		8	4.	4	P-	٠	5.32
54	00	Ci		ា	2	00	E)	M	3.56		5	n	0	2	rv.	5.84
N 6	0,1	M .	•	₹.		3.08	M + 4 P	3.68	S . S .	4.26	9	9	3	P~ 1	6.65	6.39
97	2	3		3	S .	3	1	-	t-24		9	7 .	8	N	ů.	6.95
2 K	ہ ر •	0 1	0	0 0	٦ °	ម្ន	3) v	ໆ પ ●	2 c		o t	# CX	ه دی ه	٠ ر	4	~ ° ° ° ° ° ° ° ° ° ° ° ° ° ° ° ° ° ° °
20	1 0	= a	0 4	0 -7	2	0 -	1	U C	1007	0 1	C P	·	0 10	U X	- 14	o a la
m in	(M L	0	s 80	2 (s 'e	4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4	000	. P/	10.07		9 60	• •	9 0	יי פיי	့ တ	20.00
31	7	-		7	4	80	7	1	6.47	s 4	14	000	77	0	2	١ =
32	-9	2		_	-7	-		· 🕶	6.40		00	-1	9.00	: 40 •	. (V)) (Ti)
33	9.	40		0	10	7.	2	n.	6.91	i =	10	0	9.	m	0.9	-
34	1	10	- 0	2	(.)	00	5	0	7.35	- 00	00	9.0	9	100	4 6	2
LS 1 1 (∾)	ω •	-		TI	y (v)	71	٠.٠	7.	* 00 1		4.	ਜ • •	5	1.6	200	LA3 1
33	3	0		9	0	5 0	7 0	2 1	2000		ອາ ເ	0 v	100	7 . 4	2 0 1	W3 -
i. αΩ	<i>ا</i> د	0 P	0 C		0 ° ° ° ° ° ° ° ° ° ° ° ° ° ° ° ° ° ° °	7 4 3 5	- a	ο α α	0.70	• • 	3 T	1	12.00	200 200 200 200 200 200 200 200 200 200	14,70	J ((
39	1 (J M.		10	2 4		, _	P 0	0.76	10	1.7	200	7 2	7	2	VI C
3	(1)	L	4.72	ď	e e		(\d	0.75	10°20	. +	t.	3 .		n,	0.7) r~
41	60	-		4-1	53	ru.	S.	Ç 1		4-4	3 . 5	401	5.5	€ 3	700	CO
24	0	0		4	~	0	T-4 B	.3	₹#1	e N	3.7	6 a 47	9 9	7.1	8 2	ייט
243	- 0	4 L	74.0			40	₩ ₹	44 4	∓	ע (ייו	70 7	10 th	90 4	د د د	٠ د د	2 4
t 2		ំ រ	0 0	1 7	t a	0 FC	101	4 1	UIM	0 7	1 E	0 -	0 7	0 0	1 6	-1 C
79		1		~		1	. 10	1 6) PO	ເ	1 40	10	(M)	F 7	, , , ,	i M
47	70	0	100	44	1.	1 = 2	200	14,	13	in a	7.3	8.7	3.2	4.6	3 . 0	3
84	J	7		7	0.7	1.7	3 . 3	3	3	9	8 +	6	1.1	2.6	4. 1	451
O"	3.6.	7) n w 3 i = 0	7 = 4	α, 0 α, 0 π, υ	10 T	12.27	13,04	K - 3 T	1000	17.25	18,87	26.47	22,26	23,63	255	26.72
7 7	- 0	0	0	4	7 0 7	7 0 7	•	3 4	CIN	- 0	2 = 2	000	2 0	0 4	7 0 2	~ U
4 20	6 A	0 7 • •			* C	0 00 0 00 0 00 0 00	1 60	ື້ ພື	p r~	e e	1 M 2	9 8 M W	0 4	4 C	~ w	13 C
53	(V)	12		9.	2.4	4.3	6.4	1	100	3	2.1	1 0 4	6 . 3	7.8	9.6	-
54	(7)	٠ ت		9	2.3	9 • 4	۰	30	0,	٠	ت ارج	5 .	600	28,96	8 . 3	LV4
55	L)	N- 0		101		in in	9	70	0	+	6 M	ارا ا	8		2 . 5	67
56		-		1.0	00 I	6.4	000	0	J 19	N I	00 1	0 0	01	101	2.5	EN I
n u	1	N 16	ф :	10° 34	140 5/	00	10°0'	2. 9T	L (76.27	2000	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	4 6 4 4 5 4 5 5 5 5 5 5 5 5 5 5 5 5 5 5	25.52	 1 L	J 1
20	2 (0,00		0 1	ر. کا ۲	10	1 1	2 4	110	2 4	2 2	S . C .	1 17	107		- 0
·	, i	, ,		1 10	16.91	1 x x x x x x x x x x x x x x x x x x x	24 7		24,64	1 (0		M = 10 M	71 1	0	۲. ور	1 (2)
	i		•		•		4			1		1				3

Table 42.--Log weights for scaling lengths of 34 to 60 feet: density index = 68 pounds per cubic foot

[Assumed taper of 1 inch per 8 feet, trim allowance of 1 inch per 4 feet]

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	n g	6 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4	1 0	9 f c		0 0	1.00	- 0		- 0			0	0 1	0 1																															64.75		
	36	21.0	7	- C - C - C - C - C - C - C - C - C - C	× × × ×	2 4 4 5 4 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5	1.98	0 0 0	2.77	3+27	3.82	1000	V = 0.7	44.9	7.26	000	38.35	2	16,56	11.64	10,600	·	7 6 7	17.13	12 0 1	10.67	56.94	65.655	7 4 6 0 2 4 4 8 0	26,51	2 57, 10 10 br>10 10 10 10 10 10 10 10 10 10 10 10 10 10 1	72007	34 0 34 0 34 0 34 0 34 0 34 0 34 0 34 0	74.15	36,39	38.17	0 4 6 4 4 1 4 7 11 E	63.75	170 14	67.69	12 10 19	1.1.26	5 to 0 d	5 P - 2 R	79°56	62.84	6. 14	ts / a / s]
	74	* * * * * * * * * * * * * * * * * * *	77.	** : 1 :																																										F0.85		
	€3 ¥4	***	, 17 m	0.1.6						- 6	- 0	- 69									-			0 1			- 0			6 0		-	- 0	0 4		-		0 4		- 9				-	0 0	F 8 . P 7	-	
	u u	+ 15	3 7 0	7 :	, -		2604	2.21	2.66	7 - 11	7.61	6.45	1000		5 2 2	7.63	4063		9,95	10.73				15.71		1 4 1 7	19.16	11	10000	200000	11610	31072	28 o 14 o 1	11.6	77,64	24.659	00000	30.73	11 1 1 1 1	2. "2 ">	41.02.	200 17	613.04	10 0 1 1 E	1 2 2 3 5	56.47	196,086	
(FEET)	4 A	* * * * * * * * * * * * * * * * * * *	7790	\$ F		 	1.79	2.17	2010	3006	7 0 2 2	an 6 Co .	7 - C - C -	- U	. 6.	7 . 22	7.97) / e ::	95.6	10041			~ -			1 2 0 2 1	13.54	100		23.67	, 4 . H.	11.437	27.55	2	41.96	34.50	C 2 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	34.35	41014	41.10	20,000	., ., .	1,7 . 16	4 C - C - C - C - C - C - C - C - C - C	300 J	54.85	Jn * J ;	r r
LENGTH	4	# T	5.70	40.			1075	2013	47 1 0 6	2.07	30 4, 5,	3 ° 0 ° °	3 h	* L	Q - 2 - 3	7 o f 1	7072	2 t 4 t 5	9.27	40010	711			14.71	1000	1101	17001	F 7 * C #	34 24	22.65		1 1 1 1 1	25.58	2000	3000	32036	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	26.4F	# 12 ° 12 12	14 7 . 1 . 14	1 10 0 1 4	1 1 0 2 1	55.64 52.04	10.07	50000	R 20 P 3	4 6 9 4 1	. h. (]
SCALTAG		17	57	7 0	4 C		73	C.	F 67		ر رب	10 t		7	- 5	C	L 43		96	9.75		, , , , , , , , , , , , , , , , , , ,				-	7.56	1.	2 6 2 6	0 6	, ₁	01 01	0, 0 0, 4	7 ° °	41.6	4.09		- 12 - 12 - 12 - 12 - 12 - 12 - 12 - 12		-	1	1 !		7 4 6	27.00	5 2		14 P
	2.7	17	-9-			- No	Po.			PH	-9 .	D 1				/	2v		77		ma I						11			10		-			3	9 7		61	100			_		7 4		Pos.		
	6.7	0 0) E	4) 5) 0	a -		1000	50.14	2.41	2.82	4000	2.6		1 2 6	200	6.677	7007		4.65	1000	-			1 1 6.7			16.61	-				•	24.52	1000	C F + 4 B	2 C , R L				1 1 . 1	6 4 6 7 7		11 4 7 B		4 1 4 1 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7	2 P 4 (3-45)	0 6. 6.	
	7 %	4 1	7 0		• •		1.65	1.00	1 2 1 2 0 2 1	2076	5016	F 0 +			- F. G	7- 0- 1	6.97	2 1 4 6	رد ۱۳۰۰ عار	9 . F				, 11,	16.0 6	14.	16.91	11 . 11		70.00	-		120 P.P.	11.00	11011	30,000		12.67			» /,	1 0 1 4	1 0 1	1 1 1 1 1 1	46.	1,1 2,34	y	4
	¥ 24	* - * · ·		32 9		-	-			702	e per	20 4			 	200	5.1	. *	0.0	0.0		-				;	1500	· .				7				27.			1			*				3 0 5 5	1.	- - - -
	4.	# * ·	0 (1.1)	- C - C	m ~		1.56	P. 1 0 0		70116	1.995	3 . 16	7	. 77		71.0	2446	, *	10816	1.72						, ,	1.6 0 5.7	•		1 1 0 3 6 3		1 4 14	0 0 0			26.007			11.02	0	1		* * * * *	(1), 74		62.59		
	-,																																															1 1 1 1 1
	di F	0 .	3 3 .	- 1 - 1	. , , ,		0 0	100	2.12	0407	2023	200	7.2.4.			9.59	11 + 1 - 7		7 . 51	7004		, .,	, . ,	11066		*	13007		- [17066		1 1	200 000	0,010		240/1		23000	23.45	+, + * /		*	- 5	27. 60		40.13		2 4
1 202 W	(INCHES)	C ~	. &	in t	J -		44	14	15	15	1.7	C :	7 7	2.4	22	- PO	24	26,	26		**************************************) - - -	- C		of by	35	1	0 20		7 87	+1	00 m	r 2		25	7 :	5 9	5.0	, j	, ,		2 11	n 4	1	5.8	000	

Table 43.--Log weights for scaling lengths of 4 to 32 feet: density index = 70 pounds per cubic foot

[Assumed taper of 1 inch per 8 feet, trim allowance of 1 inch per 4 feet]

LOG WEIGHT (KIPS*) FOR DENSITY INDEX=70

(J) (J)				de a difference de		The second secon	man handyman and hand	SCALING	G LENGIH	H (FEET)	(The second secon	n place or more	*		1
INCHES	4	9	9	10	10	14	16	17	1.8	20	22	24	26	28	30	32
9	-	* 0.7	6 y °	0.1.1				-	.17	.17		. 19	.19	• 19	• 20	€
~	• 0 7	. 10	P) P	• 15	4 4 6 7	• 20		100 E	*24	,26	•27	e 2.8	0.7	.30	3.0	± 60 €
0 0	2 -	4 7	0.10	4 .			3 2 2	1/4	200	າ -:	이 :	ם מי	150	24.0	27 12	3 4
# C	4 +		0 00	9 2 4		? ব	3 G	7 UF	0 LL C	2 L		U R	. 74	10.	 	UP
11	0.00	92.	450	3			6.2	. 65	68	.74	IN	38.	988	. 93	o	- 3
12	5	22.	041	.56		9	P=	P~	F 0 0	σ	0	-	0	-	10	2
13	CU	.37	640	w			0 0	0	6.	9	7.	100	(M)	100	4	5
14	^-	1. 41.0	657	. 76		0	0		1.	0	7.	47 0	5	(Q)	7	. 7
9	P()	.50	9.65	QC:	σ.	0.	12	2	[Y) 0	4.	5	-	0.0	0	0	J .
9 1	MO.	.57	• 75	တ္ပုံ	0	0	3	3 0	in I	46	00	σ.:	0 •	C/E	M):	4 4
	4	•65	S C	· ·	, N	2 1	0 (D 1	φ (ρ,	3	21	M) 1	S	9	~
TO -0	3 3	2 0	660	ed P	S n	(C) P	ع . •	1.00	6.0	₩.	M) (e U	~ (cc (> .	·
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4 00	1 1	0	1044	-	, -	4 47	- 2			. P7	3 49	. 0	. 41	7 3	3 1	. 0
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40	2		1.72	Τ.	5	2	5	7	<u>اع</u> ،	0	M)	7.	۵	5	7	3
25	6.0	- 49	1.87	[NJ	~	4.3	e U	6.7	9	PO	£ .	1.	r.	8	6	e.
92	0	- 01	2003	5	6	70	. 3	4	60	7	7	9	0	-31	1	
27	باب ه		7,10	r- (~	<u>٠</u> :	4	9.	۲,	9	۱ و	5	0 1	P2 (٠.
9 00	20		2 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6	D '4	3 P	2 0	*) 25 0	E 7	⊋'⊹	* c	0 4	al Raid	ا ب	DIE	5 4	-31 C
3.6	9 ~		0 - 4	-1 M		9 4	e 0	4 ú)) 0		<u>ه</u> د	သ () •	٠,	3 3	กิ	۰ د د
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Table 44.--Log weights for scaling lengths of 34 to 60 feet: density index = 70 pounds per cubic foot

[Assumed taper of 1 inch per 8 feet, trim allowance of 1 inch per 4 feet]

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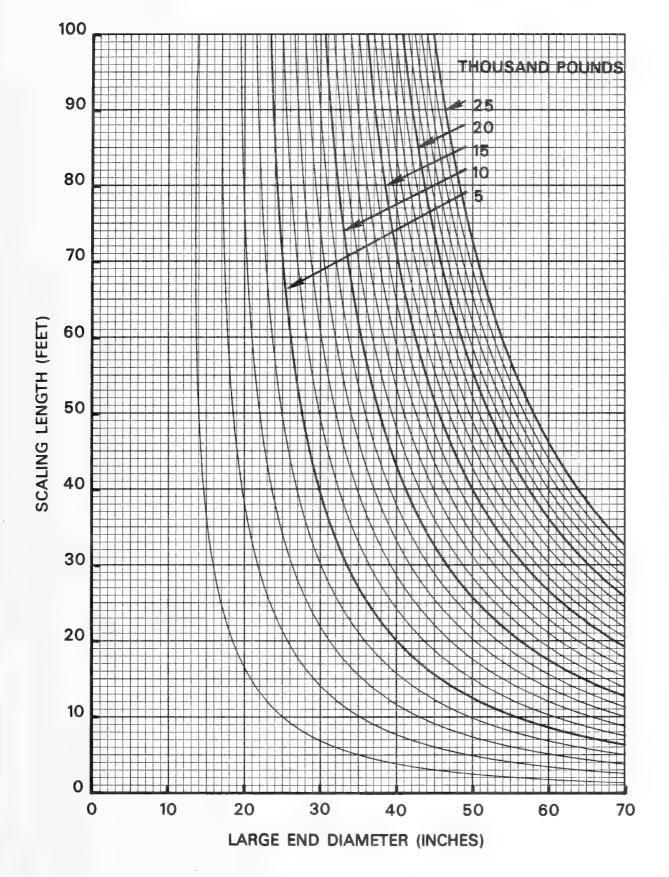


Figure 5.—Scaling length versus large end diameter for various log weights. Density index = 30 pounds per cubic foot. (Assumed taper of 1 inch per 8 feet, trim allowance of 1 inch per 4 feet.)

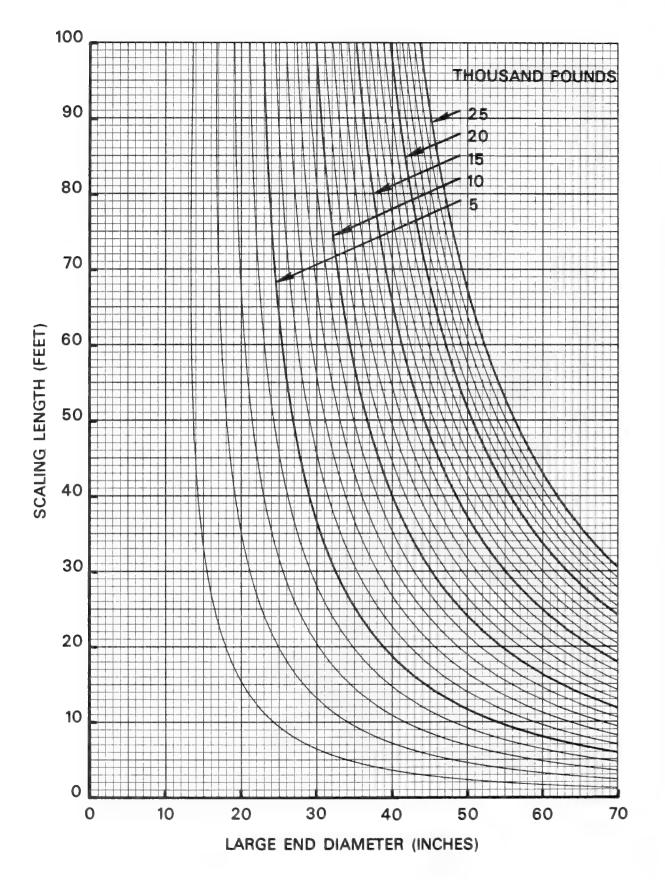


Figure 6.—Scaling length versus large end diameter for various log weights. Density index = 32 pounds per cubic foot. (Assumed taper of 1 inch per 8 feet, trim allowance of 1 inch per 4 feet.)

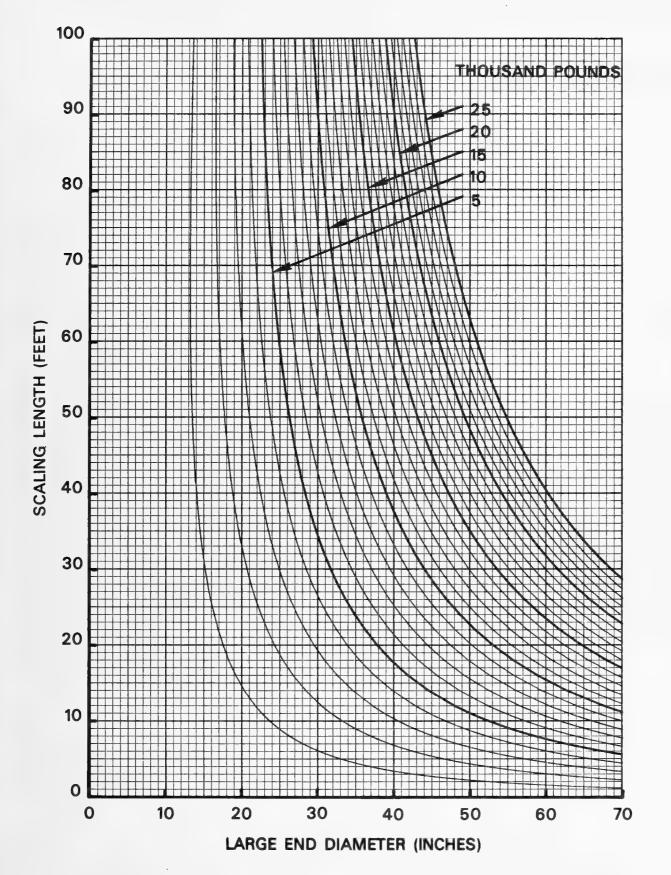


Figure 7.—Scaling length versus large end diameter for various log weights. Density index = 34 pounds per cubic foot. (Assumed taper of 1 inch per 8 feet, trim allowance of 1 inch per 4 feet.)

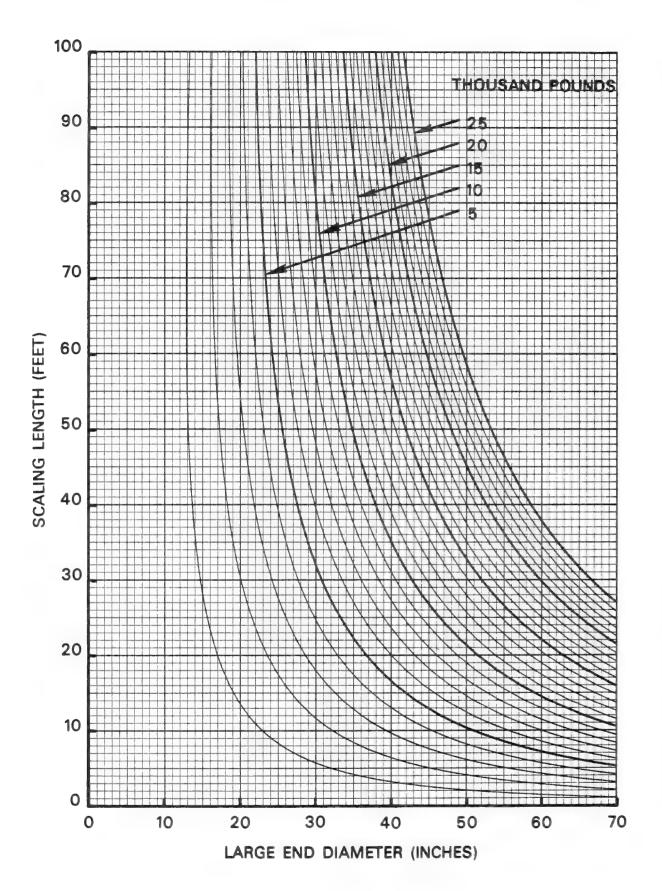


Figure 8.—Scaling length versus large end diameter for various log weights. Density index = 36 pounds per cubic foot. (Assumed taper of 1 inch per 8 feet, trim allowance of 1 inch per 4 feet.)

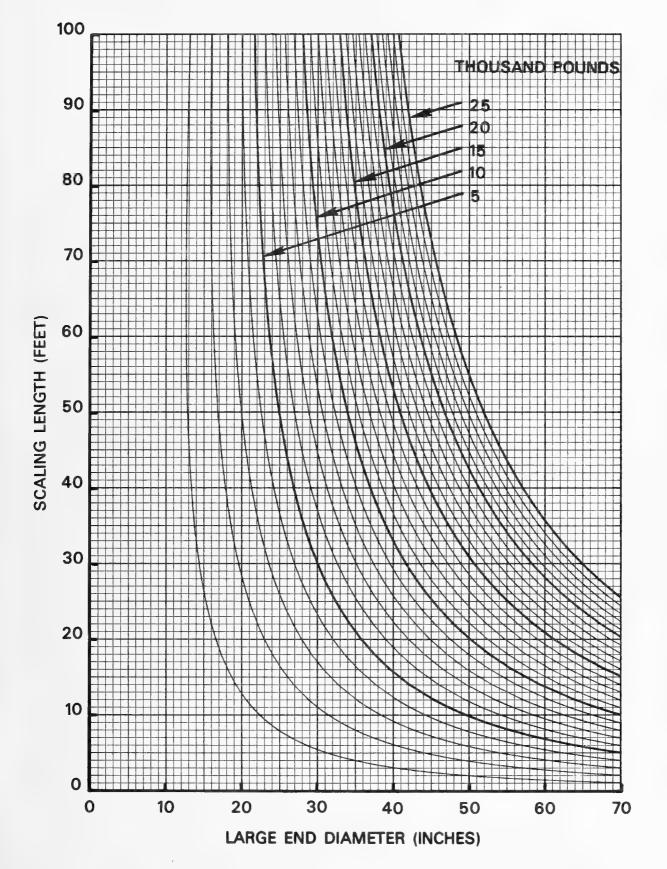


Figure 9.—Scaling length versus large end diameter for various log weights. Density index = 38 pounds per cubic foot. (Assumed taper of 1 inch per 8 feet, trim allowance of 1 inch per 4 feet.)

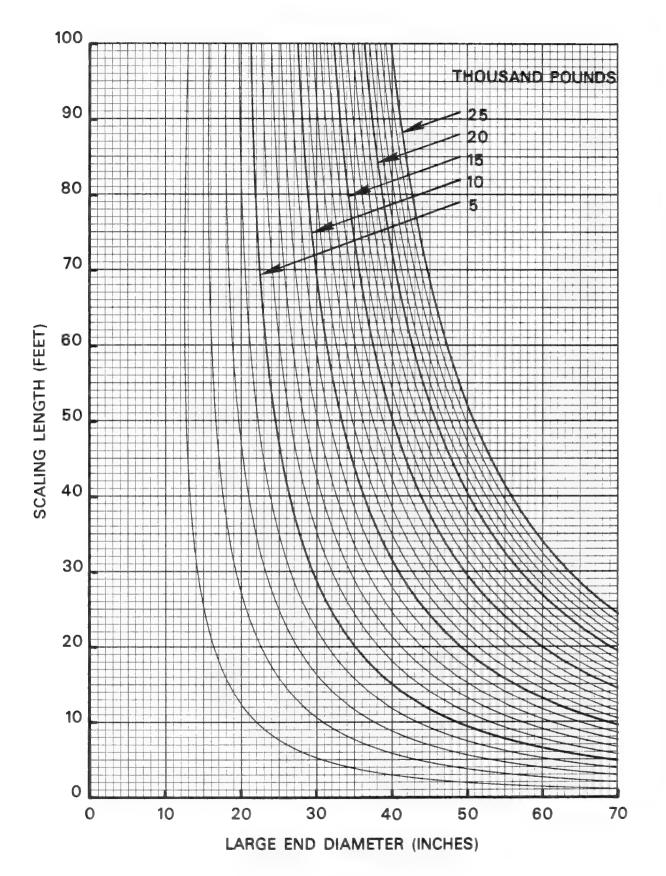


Figure 10.—Scaling length versus large end diameter for various log weights. Density index = 40 pounds per cubic foot. (Assumed taper of 1 inch per 8 feet, trim allowance of 1 inch per 4 feet.)

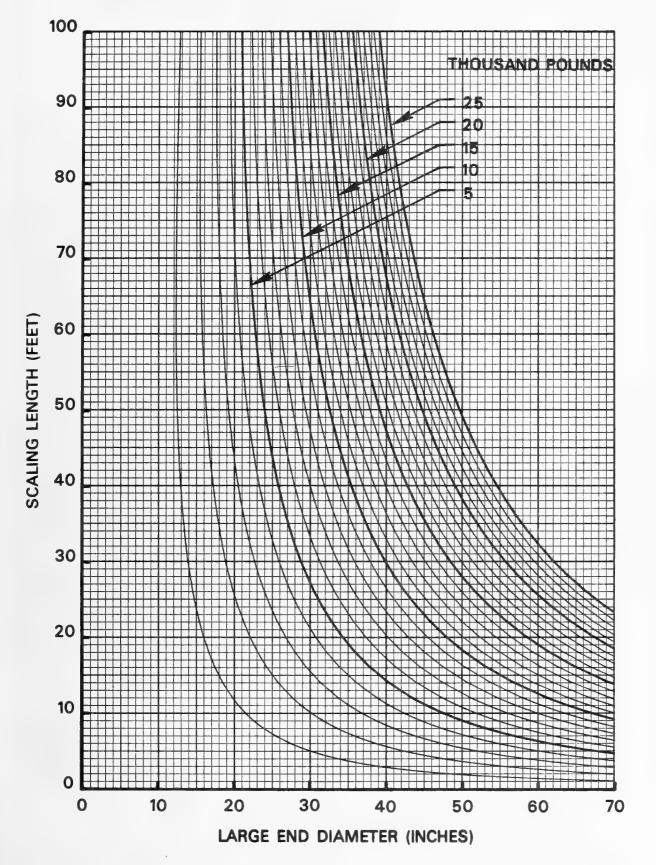


Figure 11.—Scaling length versus large end diameter for various log weights. Density index = 42 pounds per cubic foot. (Assumed taper of 1 inch per 8 feet, trim allowance of 1 inch per 4 feet.)

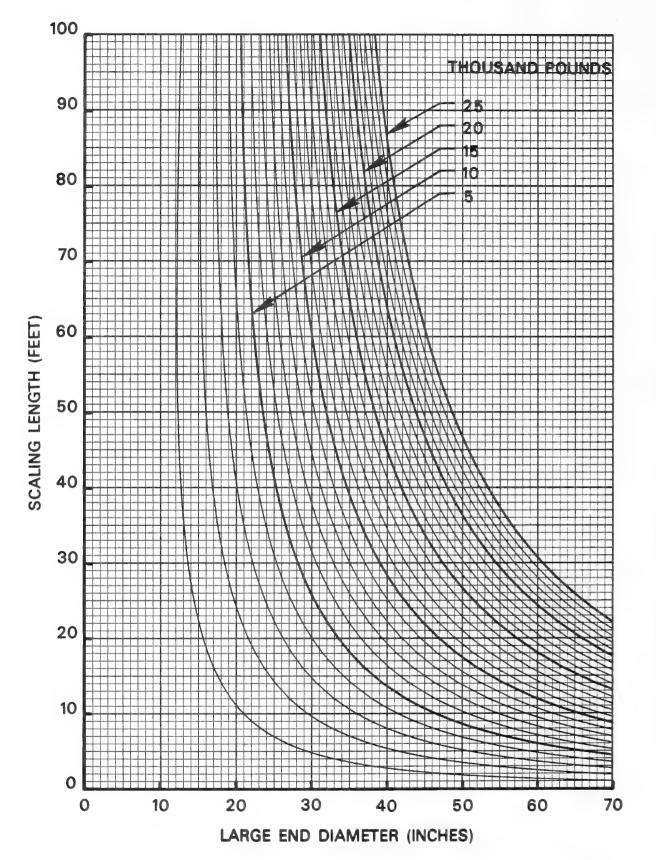


Figure 12.—Scaling length versus large end diameter for various log weights. Density index = 44 pounds per cubic foot. (Assumed taper of 1 inch per 8 feet, trim allowance of 1 inch per 4 feet.)

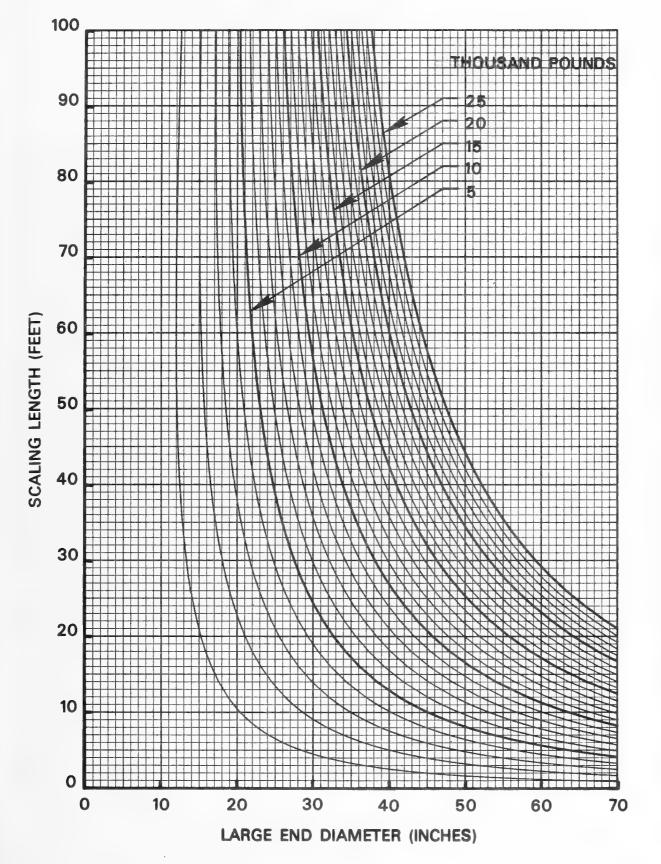


Figure 13.—Scaling length versus large end diameter for various log weights. Density index = 46 pounds per cubic foot. (Assumed taper of 1 inch per 8 feet, trim allowance of 1 inch per 4 feet.)

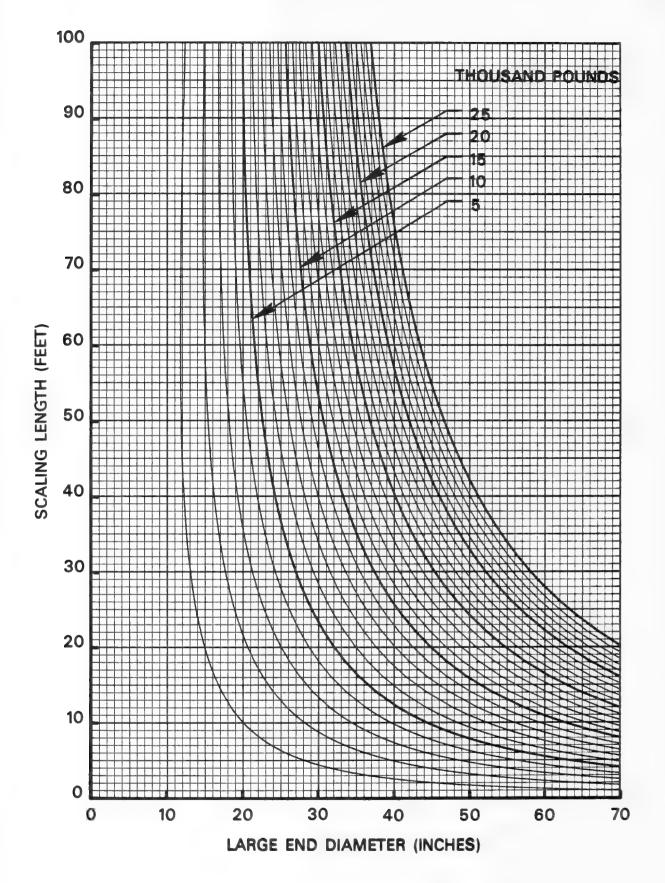


Figure 14.—Scaling length versus large end diameter for various log weights. Density index = 48 pounds per cubic foot. (Assumed taper of 1 inch per 8 feet, trim allowance of 1 inch per 4 feet.)

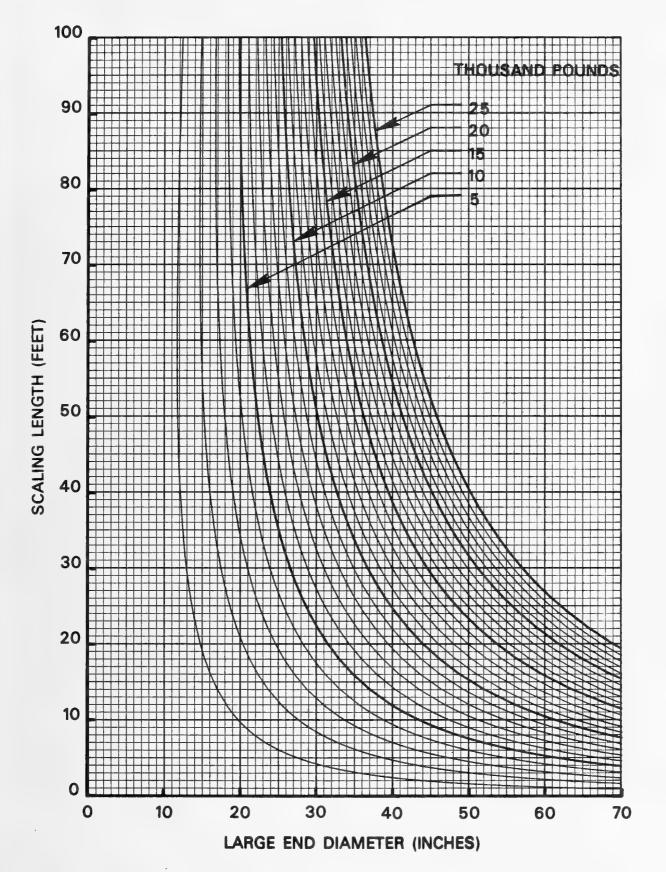


Figure 15.—Scaling length versus large end diameter for various log weights. Density index = 50 pounds per cubic foot. (Assumed taper of 1 inch per 8 feet, trim allowance of 1 inch per 4 feet.)

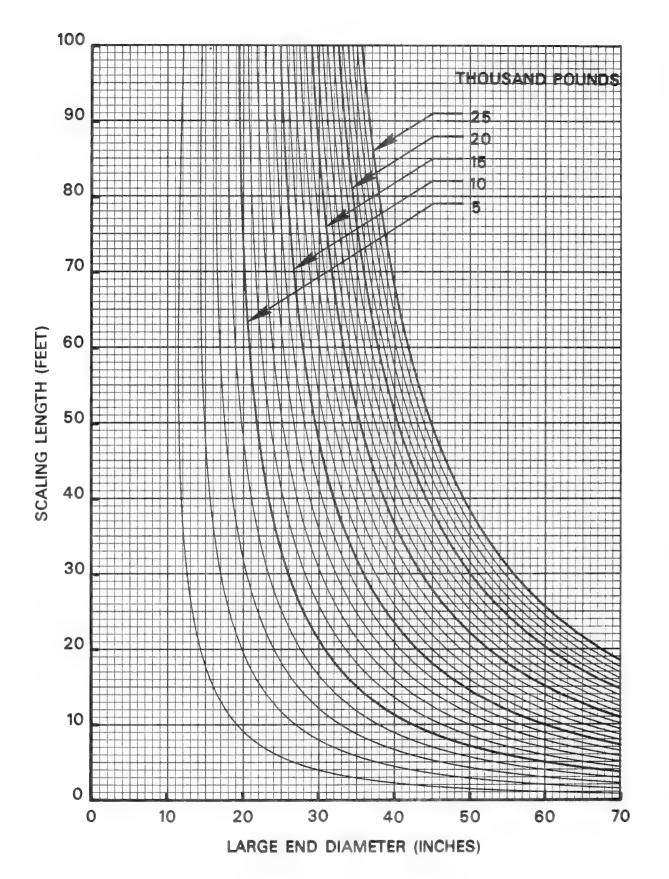


Figure 16.--Scaling length versus large end diameter for various log weights Density index = 52 pounds per cubic foot. (Assumed taper of 1 inch per 8 feet, trim allowance of 1 inch per 4 feet.)

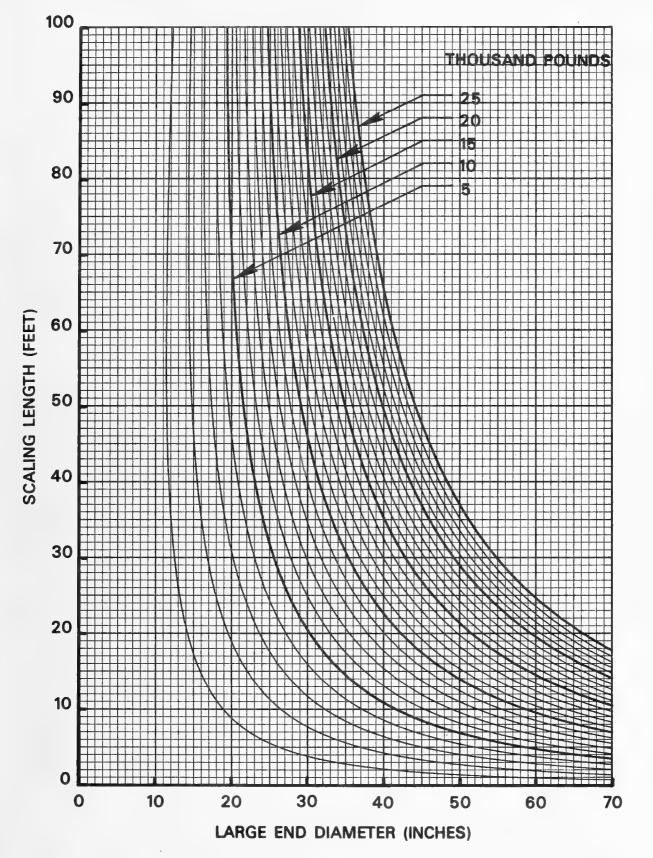


Figure 17.—Scaling length versus large end diameter for various log weights. Density index = 54 pounds per cubic foot. (Assumed taper of 1 inch per 8 feet, trim allowance of 1 inch per 4 feet.)

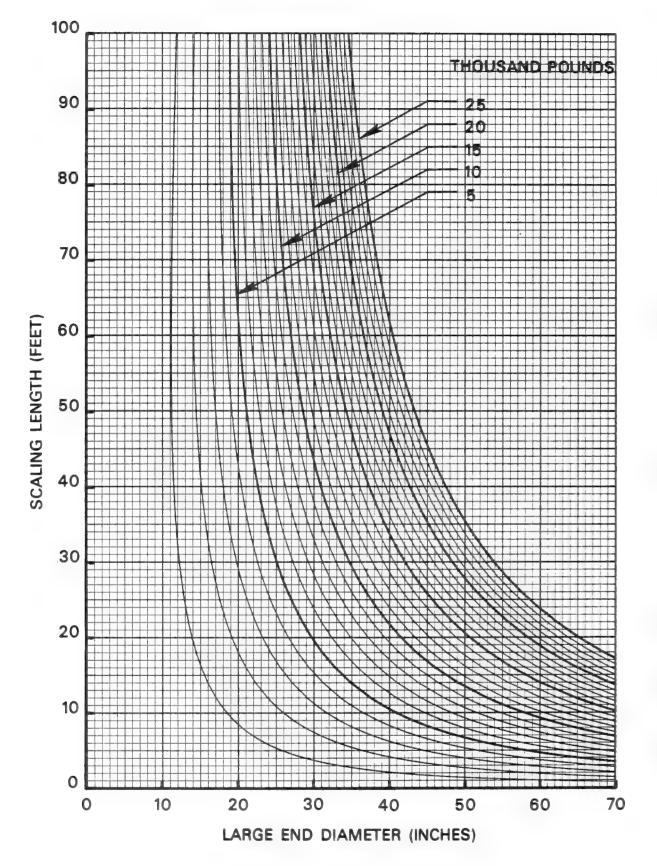


Figure 18.—Scaling length versus large end diameter for various log weights. Density index = 56 pounds per cubic foot. (Assumed taper of 1 inch per 8 feet, trim allowance of 1 inch per 4 feet.)

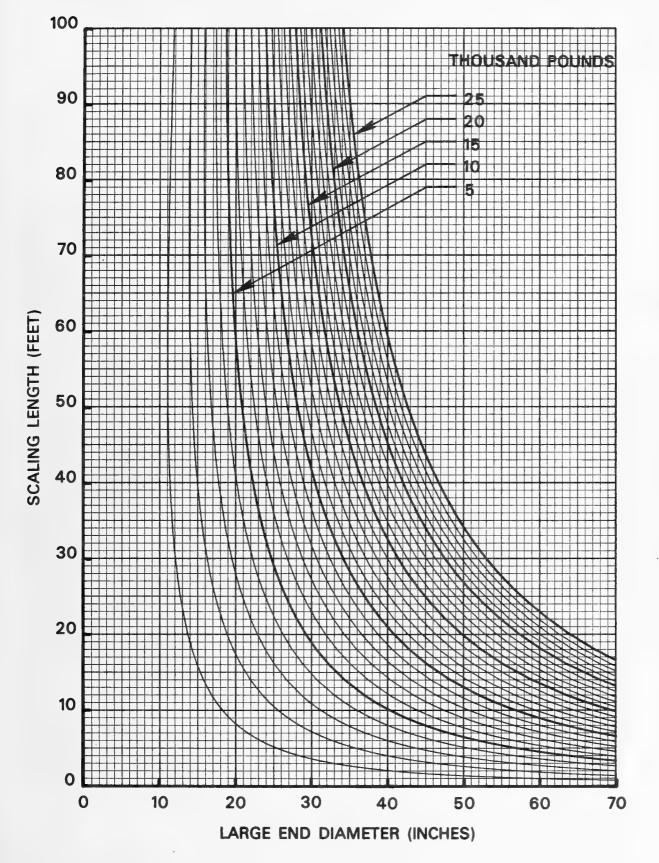


Figure 19.—Scaling length versus large end diameter for various log weights. Density index = 58 pounds per cubic foot. (Assumed taper of 1 inch per 8 feet, trim allowance of 1 inch per 4 feet.)

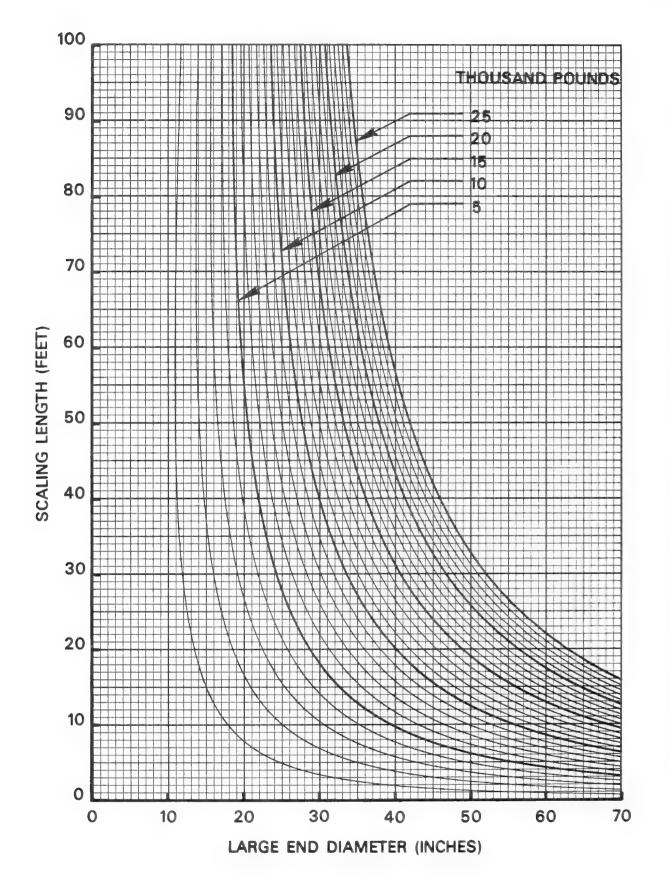


Figure 20.—Scaling length versus large end diameter for various log weights. Density index = 60 pounds per cubic foot. (Assumed taper of 1 inch per 8 feet, trim allowance of 1 inch per 4 feet.)

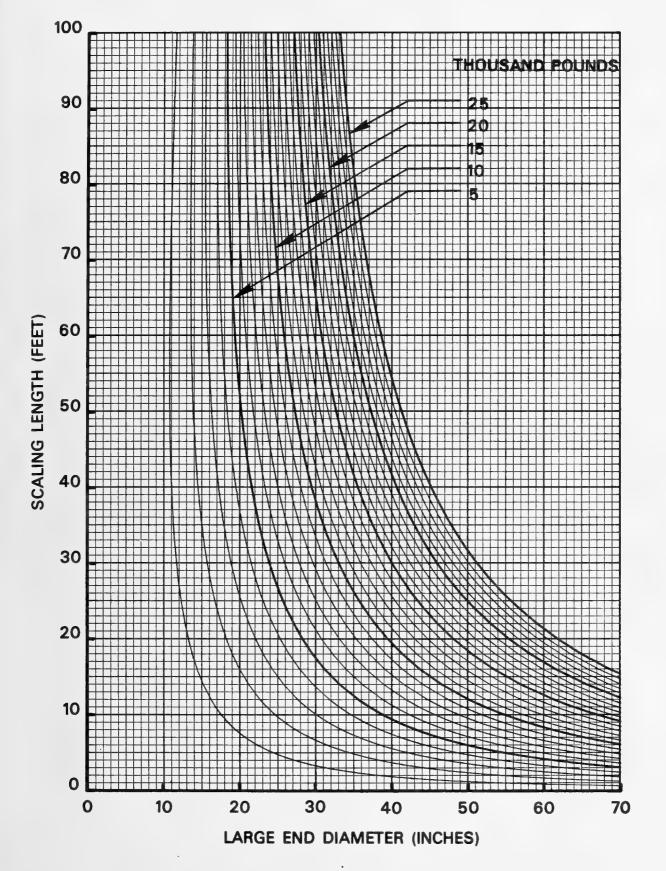


Figure 21.—Scaling length versus large end diameter for various log weights. Density index = 62 pounds per cubic foot. (Assumed taper of 1 inch per 8 feet, trim allowance of 1 inch per 4 feet.)

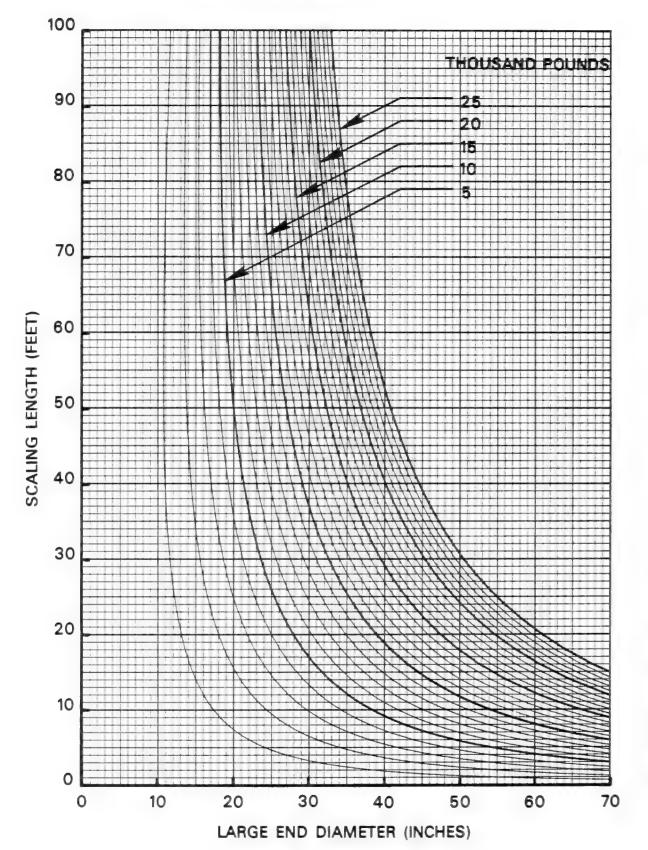


Figure 22.—Scaling length versus large end diameter for various log weights. Density index = 64 pounds per cubic foot. (Assumed taper of 1 inch per 8 feet, trim allowance of 1 inch per 4 feet.)

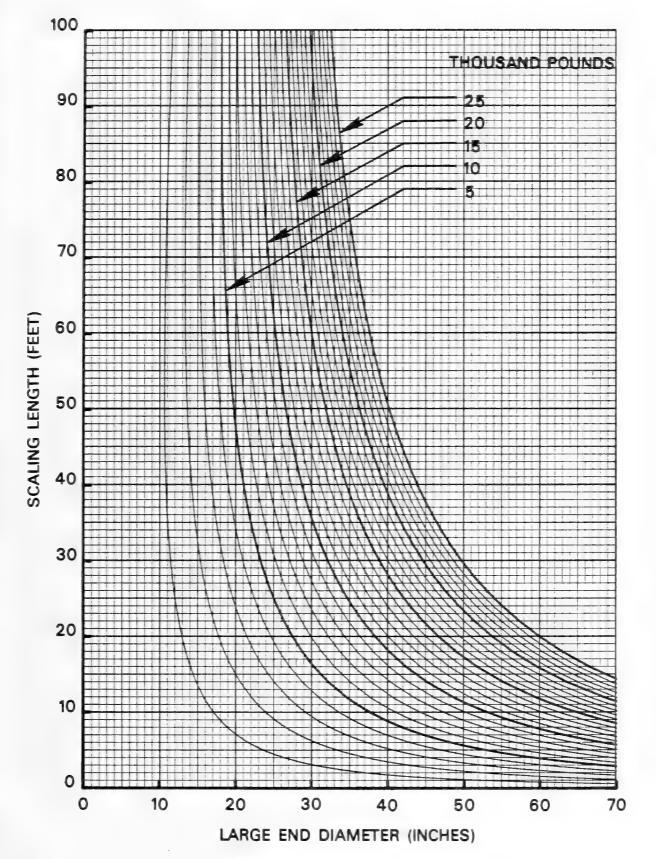


Figure 23.—Scaling length versus large end diameter for various log weights. Density index = 66 pounds per cubic foot. (Assumed taper of 1 inch per 8 feet, trim allowance of 1 inch per 4 feet.)

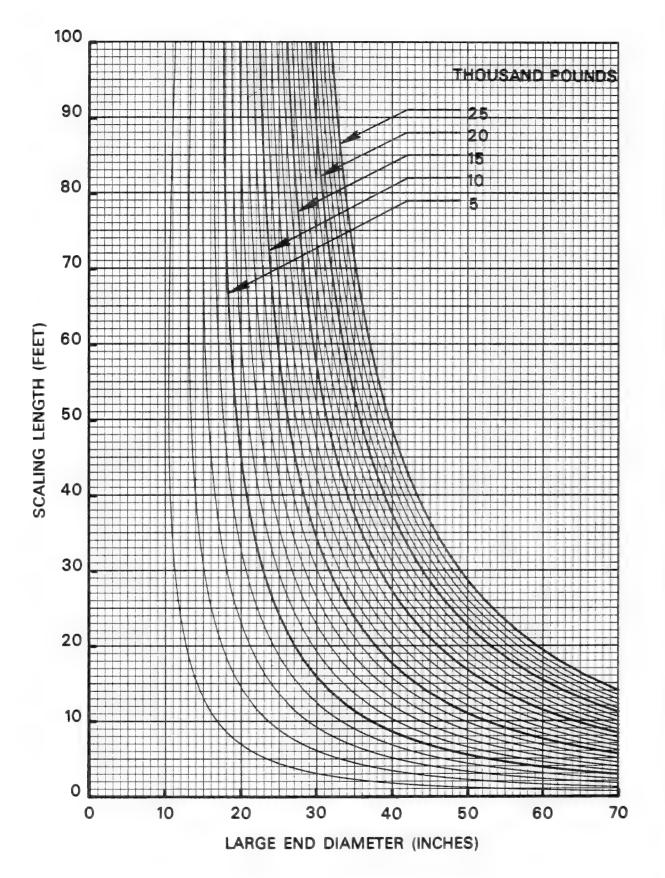


Figure 24.—Scaling length versus large end diameter for various log weights. Density index = 68 pounds per cubic foot. (Assumed taper of 1 inch per 8 feet, trim allowance of 1 inch per 4 feet.)

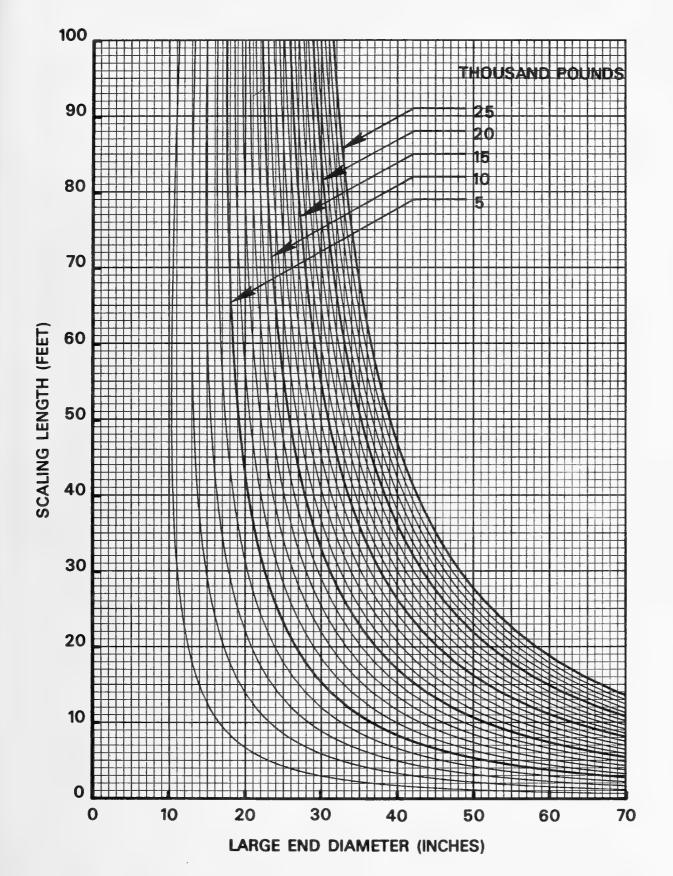


Figure 25.—Scaling length versus large end diameter for various log weights. Density index = 70 pounds per cubic foot. (Assumed taper of 1 inch per 8 feet, trim allowance of 1 inch per 4 feet.)

Figure 26.—Density index worksheet.

Sample No.	Date		Truck No	Load No	0	
Gross weight			Logging site			
Tare v	Tare weight		Species			
Net log weight		lbs.				
Scaling length <u>l</u> / (feet)	Large end diameter (outside bark, inches)	Volume <u>2</u> / (cubic feet)	Scaling length1/ (feet)	Large end diameter (outside bark, inches)	Volume <u>2</u> / (cubic feet)	
	<u> </u>		TOTAL	CUBIC VOLUME		
Density inde	Net log weig	htlbs.		11	b./cu. ft.	
Density inde	Total cu. vo	olcu.	ft.		0./ 04. 10.	
<u>1</u> / Use · <u>2</u> / Table	local scaling pra					

Figure 27.—Worksheet for moving average of density index.

Logging	site	Species
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Sample number	Date of sample	Sample density index	Moving total of density index <u>l</u> /	Current moving average <u>2</u> /
			,	

 $[\]frac{1}{}$ Add newest sample and delete oldest sample which was included in previous total.

 $[\]frac{2}{}$ Divide moving total by number of sample in moving average.



Mann, Charles N., and Hilton H. Lysons
1972. A method of estimating log weights. USDA Forest
Serv. Res. Pap. PNW-138, 75 p., illus. Pacific
Northwest Forest and Range Experiment Station,
Portland, Oregon.

Presents a practical method estimating the weight of logs before they are yarded. The method is based on obtaining an initial sample for a cubic density index and then applying the index to log dimensions for weight estimates. The use of this method should facilitate the application of aerial logging systems.

Keywords: Logs, weights, logging.

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The mission of the PACIFIC NORTHWEST FOREST AND RANGE EXPERIMENT STATION is to provide the knowledge, technology, and alternatives for present and future protection, management, and use of forest, range, and related environments.

Within this overall mission, the Station conducts and stimulates research to facilitate and to accelerate progress toward the following goals:

- 1. Providing safe and efficient technology for inventory, protection, and use of resources.
- 2. Development and evaluation of alternative methods and levels of resource management.
- 3. Achievement of optimum sustained resource productivity consistent with maintaining a high quality forest environment.

The area of research encompasses Oregon, Washington, Alaska, and, in some cases, California, Hawaii, the Western States, and the Nation. Results of the research will be made available promptly. Project headquarters are at:

Fairbanks, Alaska Juneau, Alaska Bend, Oregon Corvallis, Oregon La Grande, Oregon

Portland, Oregon
Olympia, Washington
Seattle, Washington
Wenatchee, Washington



The FOREST SERVICE of the U.S. Department of Agriculture is dedicated to the principle of multiple use management of the Nation's forest resources for sustained yields of wood, water, forage, wildlife, and recreation. Through forestry research, cooperation with the States and private forest owners, and management of the National Forests and National Grasslands, it strives — as directed by Congress — to provide increasingly greater service to a growing Nation.